U.S. NUCLEAR REGULATORY COMMISSION

REGION II

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License No:	DPR-72
Report No:	50-302/99-08
Licensee:	Florida Power Corporation
Facility:	Crystal River 3 Nuclear Station
Location:	15760 West Power Line Street Crystal River, FL 34428-6708
Dates:	November 7 through December 25, 1999
Inspectors:	S. Cahill, Senior Resident Inspector S. Sanchez, Resident Inspector G. Hopper, Reactor Engineer (Section O5.1) M. Sykes, Reactor Engineer (Section O5.1)
Approved by:	L. Wert, Chief, Projects Branch 3 Division of Reactor Projects

Enclosure

EXECUTIVE SUMMARY

Crystal River 3 Nuclear Station
NRC Inspection Report 50-302/99-08

This integrated inspection included aspects of licensee operations, engineering, maintenance, and plant support. The report covers a seven-week period of resident inspection; in addition, it includes the results of an operator requalification program inspection by regional reactor engineers.

Operations

- Plant heatup, reactor startup, and low-power physics testing were conducted in a safety-conscious manner. Operators were methodical during evolutions and closely monitored plant parameters (Section O1.2).

- Licensee tracking and disposition of mode restraints were effective. Potential emergent mode restraints were effectively resolved in the corrective action program. Management hold point review meetings were thorough (Section O1.3).

- The cold weather procedure was adequately revised for the new emergency feedwater pump building and implemented appropriately (Section O1.4).

- Operators responded effectively to a plant runback caused by a dropped control rod. Bent rod drive connector pins and a degraded stator were diagnosed as the cause, necessitating a forced outage to repair. Problems were also noted with improperly connected control rod drive cooling water lines. Operators performed well during plant condition changes and no discrepancies were noted. The post-outage critique was an effective and self-critical review (Section O1.5).

- The alignment of emergency feedwater pump 3 (EFP-3) and the overall condition of the EFP-3 building were satisfactory. Minor discrepancies with valve seals were noted but were appropriately addressed by the licensee (Section O2.1).

- The content of the annual operating test and weekly written examinations was satisfactory. The licensee's feedback process and remedial training were satisfactory and re-evaluation testing appropriately addressed identified operator deficiencies. These portions of the licensee's operator requalification training program met the requirements of 10 CFR 55.59 (Section O5.1).

Maintenance

- Surveillance testing activities for the plant startup from the refueling outage were well controlled and well planned due to accountable individuals assigned prior to the outage. Monitoring of nuclear services closed-cycle cooling system heat exchanger leakage was appropriate (Section M1.1).

Engineering

- The temporary modification tracking system was detailed and effectively correlated with other systems such as work requests. The licensee had thoroughly addressed all open temporary modifications in their refueling outage planning (Section E1.1).

- Beginning of cycle rod drop time testing identified that one rod was out of specification. The licensee exercised the rod to flush blocked thermal barrier flowpaths and retested it. A detailed analysis evaluated the potential for future degradation to support declaring the rod operable. The licensee's analysis also concluded that the safety significance was minimal (Section E2.1).

Report Details

Summary of Plant Status

The unit began the inspection period heating up from cold shutdown following a scheduled refueling outage. The reactor was started up on November 10 and the unit reached full power on November 15. The unit remained at full power until a dropped control rod caused a power reduction to 55% on November 23. The unit remained at approximately 50% power until November 26, when it was shutdown to hot standby to repair the control rod wiring. The unit was restarted on November 29, achieved full power on November 30, and remained at that level for the remainder of the inspection period.

I. Operations

O1 Conduct of Operations

O1.1 Routine Conduct of Operations Reviews (71707)

The resident inspectors routinely reviewed plant operations, including shift turnovers, main control room logs and equipment status, and shutdown system operation. Compliance with shutdown mode Technical Specification requirements and procedural requirements was verified. The inspectors routinely toured safety-related plant areas to verify the physical condition of selected plant equipment and structures and to monitor for acceptable system operation. Specific tours of the reactor building were conducted to verify readiness for reactor heatup. The inspectors observed the performance of several significant evolutions and reviewed associated documentation including procedures for plant heatup, decay heat removal system operation, and plant startup. No significant problems were observed. Noteworthy observations are discussed in subsequent paragraphs.

O1.2 Plant Heatup, Reactor Startup, and Low-Power Physics Testing

a. Inspection Scope (71707)

Inspectors monitored control room activities during plant heatup from cold shutdown conditions to normal operating temperature and during reactor startup and low-power physics testing. Inspectors reviewed associated documentation and verified applicable requirements were met.

b. Observations and Findings

Operators were consistently cognizant of plant status details and were attentive to control room instruments. Operators were also knowledgeable of the bases for limitations and sequencing of the plant heatup and startup evolutions. Estimated critical positions were accurate. Procedure adherence and communications were effective. Control room access was controlled to limit distractions and operators maintained vigilant oversight of maintenance and reactor vendor personnel performing tasks in the control room. Minor problems were appropriately addressed by Operations management.

Operations management closely controlled crew shift turnovers to ensure they were conducted at appropriate points in the evolutions.

c. Conclusions

Plant heatup, reactor startup, and low-power physics testing were conducted in a safety-conscious manner. Operators were methodical during evolutions and closely monitored plant parameters.

O1.3 Mode Restraint Tracking and Hold Point Reviews

a. Inspection Scope (71707)

The inspectors monitored the licensee's control of emergent issues and potential mode restraints. A random sample of corrective action system issues coded as mode restraints was reviewed and management hold point review meetings were attended to verify appropriate disposition of mode restraints.

b. Observations and Findings

The licensee significantly revised the hold point review process since the previous outage. The inspectors verified that the new process (documented in a Work Instruction) was encompassing and appropriate. The inspectors also noted that, due to significant improvements in licensee processes since the last outage (such as the more thorough corrective action program (CAP) and temporary modifications), reviews of these process databases for mode restraints were much more effective. In addition, the licensee tracked and evaluated all emergent issues in the CAP for potential mode restraints. The reviews of these items were performed by licensee management and were rigorous. Inspectors verified a random sample of CAP items coded as mode restraints were all dispositioned adequately before the appropriate mode change. No problems were found with control of mode restraints.

Hold point readiness management meetings were thorough. All plant organizations were represented and outstanding issues were discussed in detail. Inspectors observed that many groups had independently verified the validity of their tracking systems by doing detailed reviews of databases and taking tours of the plant. The inspectors did not identify any open issues that were not discussed. An open and questioning atmosphere was consistently established at the meetings.

c. Conclusions

Licensee tracking and disposition of mode restraints were effective. Potential emergent mode restraints were effectively resolved in the corrective action program. Management hold point review meetings were thorough.

O1.4 Freeze Protection Preparations

a. Inspection Scope (71707)

The inspectors reviewed revised Operating Instruction (OI) -13, Adverse Weather Conditions, and independently walked down the areas covered in the procedure. A recent revision to OI-13 addressed the new emergency feedwater pump (EFP-3) building.

b. Observations and Findings

Freezing weather preparations are implemented per OI-13 when it is predicted that the temperature at the site will drop to less than 40 degrees Fahrenheit (°F) within the next 24 hours. When projected freezing temperatures have subsided for more than 24 hours, restoration of the preparations may be implemented; otherwise OI-13 will remain open and items that may freeze are monitored shiftily. During the inspectors' walkdown, the EFP-3 battery room thermostat setting was found to be set slightly below the recommended setpoint, but actual temperature in the battery room was acceptable and did not affect operability of the batteries. The inspectors determined that the thermostat had been set correctly when OI-13 was implemented during the night, but that workers adjusted the setting in the morning to make the room more comfortable to work in. Operations subsequently placed a sign near the thermostat stating the reason for the setting and that the setting should not be adjusted, and monitored the area more frequently while the cold weather procedure was in effect. No other concerns were identified during the inspectors' walkdown.

c. Conclusions

The cold weather procedure was adequately revised for the new emergency feedwater pump building and appropriately implemented.

O1.5 Rod Drop Causes Asymmetric Rod Plant Runback and Forced Outage

a. Inspection Scope (71707, 37551, 61726)

During routine control rod drive trip breaker testing on November 23, 1999, reactor control rod 2-8 dropped from the fully withdrawn position and inserted into the core. An automatic runback to 55% power occurred as expected. Inspectors monitored the response to the dropped rod.

b. Observations and Findings

Through observation of control room indications and interviewing operators, the inspectors determined the plant had responded as expected except for one minor problem. Automatic control of the B train main feedwater block valve was erratic during the runback, but operators took manual control appropriately. The valve was returned to automatic and was controlling properly following the runback. The licensee investigated

and corrected the erratic transient control. Operators appropriately monitored reactor parameters for the dropped rod effect on power distribution and promptly implemented the correct steady state quadrant power tilt Technical Specification (TS) surveillance requirement. Several other TS requirements also became applicable due to the dropped rod. The inspectors verified that the TS requirements were correctly identified and implemented. The inspectors did not identify any concerns with the operator response to the runback. Appropriate licensee management and reactor engineering personnel were called in to support the subsequent troubleshooting and repairs. Quality Assurance personnel were monitoring the activities.

Troubleshooting indicated that the problem with the rod was in the reactor building so a shutdown to Mode 3 was initiated on November 25. Subsequently, it was identified that the control rod drive motor (CRDM) for rod 2-8 was degraded. Bent pins were found on the stator wire electrical disconnect which were repaired. The cause of the bent pins was likely due to forcing of the connector together. This issue was addressed in the corrective action system (CAP). The licensee also identified that the cooling water disconnect to the CRDM was not fully engaged which was impeding cooling flow. Further investigation identified that the disconnects on several other CRDMs worked in the October 1999 refueling outage and restored by the reactor vendor were in a similar condition. The disconnects were reassembled. The lack of flow did not directly contribute to the dropped rod and the licensee was also dispositioning this issue appropriately in the CAP. Following the repairs, on November 28, the licensee successfully performed the appropriate CRDM trip breaker testing and rod programming verifications and initiated a plant startup. Inspectors monitored portions of the shutdown sequence, shutdown surveillance testing, and the subsequent startup. No problems were noted and operators performed well in their execution of plant condition changes.

The licensee conducted a detailed post-outage critique to evaluate their performance. The inspectors noted the licensee was very self-critical in evaluating all areas of the outage. The critique identified several area for improvement and was effective.

c. Conclusions

Operators responded effectively to a plant runback caused by a dropped control rod. Bent rod drive connector pins and a degraded stator were diagnosed as the cause, necessitating a forced outage to repair. Problems were also noted with improperly connected control rod drive cooling water lines. Operators performed well during plant condition changes and no discrepancies were noted. The post-outage critique was an effective and self-critical review.

O2 Operational Status of Facilities and Equipment

O2.1 Walkdown of Emergency Feedwater Pump (EFP)-3 Valves and Components

a. Inspection Scope (71707)

Due to the recent turnover of EFP-3 to Operations as a fully operable system and ongoing work in the EFP-3 building, the inspectors performed a walkdown of the building and the EFP-3 alignment.

b. Observations and Findings

During the walkdown and subsequent tours of the EFP-3 building, the inspectors observed notable amounts of work material and debris due to the remaining work. The inspectors also identified that the condensate storage tank to EFP-3 suction isolation valve (EFV-144) was missing its seal. The valve was subsequently verified by Operations to be in the correct open position, and then resealed. Operations concluded that EFV-144 had previously been properly sealed but that ongoing work in the vicinity of EFV-144 contributed to the missing seal. Because of the ongoing work and housekeeping concerns in the EFP-3 building, Operations increased the number of tours by non-licensed operators.

Inspectors also found a minor discrepancy with several valves that were sealed instead of locked as shown on system flow diagrams. Valve positions are not controlled by flow diagrams and the licensee initiated actions to revise the diagrams. Inspectors also verified that the locked/sealed valve surveillance check list was revised to include all pertinent EFP-3 valves.

c. Conclusions

The alignment of EFP-3 and the overall condition of the EFP-3 building were satisfactory. Minor discrepancies with valve seals were noted but were appropriately addressed by the licensee.

O5 Operator Training and Qualification

O5.1 Licensed Operator Requalification Program Evaluation

a. Inspection Scope (71001)

The inspectors conducted a routine, announced inspection of the licensed operator requalification program during the period November 16-20, 1999. Specific areas of review included assessment of the licensee's requalification annual operating examination, remedial training program, feedback system, and observations of simulator and in-plant exercises.

b. Observations and Findings

Requalification Examinations

The inspectors reviewed the results from the weekly examinations. The inspectors also observed the licensee's conduct of annual simulator exercises and in-plant job performance measures (JPMs) to evaluate the quality and level of difficulty of the examination materials and to determine if the licensee training evaluators applied performance standards consistently and objectively. The inspection served to measure the licensee's compliance and effectiveness in conducting operator requalification training and testing in accordance with 10 CFR 55.59, Requalification.

The inspectors observed two crews perform two simulator scenarios each, and numerous JPMs that were administered by licensee evaluators to individuals on both crews. The examination materials that were administered met the guidelines of the licensee's examination development procedures.

The inspectors found that the licensee evaluators adequately identified operator performance issues. Specific individual and crew strengths and weaknesses were discussed in detail during the post scenario critiques. The inspector noted Operations management support during the administration of the simulator scenarios.

Remedial Training Program

The inspectors reviewed results of the 1999 requalification session weekly examinations including remediation and re-evaluation material for examination failures. Overall examination failures were appropriately remediated and re-evaluated in accordance with licensee training program procedures. Simulator scenarios were appropriate to re-evaluate operator performance.

Feedback System

The inspectors reviewed observation/evaluation feedback documentation from operators, instructors, and operations supervisors. The inspectors concluded that the comments were effectively reviewed and screened by the licensee for both necessary corrective actions and for program enhancements that were implemented into the requalification training program.

c. Conclusions

The inspectors determined that the content of the annual operating test and weekly written examinations was satisfactory. The licensee's feedback process and remedial training were satisfactory and re-evaluation testing appropriately addressed identified operator deficiencies. The inspectors concluded that these portions of the licensee's operator requalification training program met the requirements of 10 CFR 55.59.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Maintenance and Surveillance Testing Activities

a. Inspection Scope (61726, 62707)

Using Inspection Procedures 62707 and 61726, the inspectors observed portions of several work requests and numerous surveillances and reviewed associated documentation, including the following significant activities:

- SP-102 Control Rod Drop Time Tests
- SP-340D RWP-3B, DCP-1B and Valve Surveillance
- SP-115H Reactor Protection System Response Time Test
- PT-445 Control Rod Programming Verification Performance Testing Procedure
- SP-381 Locked/Sealed Valve Check List (Position Verification of Locked/Sealed Valves)
- SP-324 Containment Inspection
- SP-317 RC System Water Inventory Balance

b. Observations and Findings

The inspectors observed that testing was routinely done in accordance with procedural guidance with the procedures present and in active use. Pre-job planning for the complex refueling outage interval tests was very thorough, primarily due to the assignment of single accountable individuals to each test in advance of the outage. Test participants were well prepared for their assigned tasks. Supervisors and system engineers frequently monitored test results.

The inspectors also reviewed the nuclear services closed-cycle cooling system heat exchanger (SWHE) leaks. Previously detected tube leaks had been repaired in the outage and the licensee was closely monitoring for additional tube defects as a corrective action to Precursor Card 99-4460, as discussed in Inspection Report 50-302/ 99-07. The inspectors observed that two more leaks were found since startup and that System Engineering personnel were monitoring the SWHEs appropriately. The licensee was considering retubing all four SWHEs during the next operating cycle which would eliminate any further concerns regarding tube degradation. The cause of the defects postulated by the licensee appeared plausible and supported by the evidence. The inspectors did not identify any operability concerns and concluded the licensee was adequately addressing the SWHE leaks.

c. Conclusions

The inspectors concluded that surveillance testing activities for the plant startup from the refueling outage were well controlled and well planned due to accountable individuals assigned prior to the outage. Monitoring of SW heat exchanger leakage was appropriate

M8 Miscellaneous Maintenance Issues (92902)

M8.1 (Closed) LER 50-302/99-05-00: ASME Code Section XI System Pressure Test Was Not Performed Due to Personnel Error. Nuclear Services and Decay Heat Seawater system check valve RWV-132 was inspected and returned to service after replacing several parts, including a pressure retaining valve cover plate. A required ASME Code Section XI system in-service pressure test was not specified in the work package. The scope of the work package had been expanded but determined not to require revision. Therefore, the work package was not re-evaluated by the planner nor sent back to the inservice inspection engineer for review. In another event, spool piece RW-62 was replaced and returned to service with an ASME Code Section XI pressure test specified in the work package but not performed. The omitted system pressure tests had minimal safety significance and were subsequently performed satisfactorily. Leakage from the components would have been apparent during system operation. This licensee-identified failure constitutes a violation of minor significance and is not subject to formal enforcement action.

III. Engineering

E1 Conduct of Engineering

E1.1 Temporary Modification Control (37551)

Inspectors routinely reviewed the tracking and status of temporary modifications (TMARs) to the plant design. Throughout the previous operating cycle, inspectors found the TMARs to be accurately tracked and installed. Almost all of the TMARs were coded as refueling outage items, to be repaired or eliminated in the next available outage. At the conclusion of Refueling Outage 11 (R11), the inspectors verified that all of the R11 coded TMARs had been fixed as planned and had been appropriately closed from the tracking system. The remaining two TMARs were appropriate for the plant mode and were scheduled to be removed within several weeks. The inspectors noted the licensee's TMAR tracking system was detailed and effectively correlated with other tracking systems such as work requests. The inspectors concluded the licensee had thoroughly addressed all open TMARs in their R11 outage planning. No concerns were noted.

E2 Engineering Support of Facilities and Equipment

E2.1 Beginning-of-Cycle (BOC) Rod Drop Test Results

a. Inspection Scope (37551, 61726)

On November 10, 1999, the licensee performed beginning of the operating cycle (BOC) control rod drop time testing to meet TS surveillance requirement (SR) 3.1.4.3. The inspectors observed portions of the testing and reviewed the licensee assessment of the results.

b. Observations and Findings

Five CRDMs were repaired in the refueling outage due to slow end of cycle drop times. No concerns remained pending successful BOC drop testing. The BOC testing identified that rod 5-3 (location G-13) took 1.67 seconds to reach the 75% inserted position, exceeding the acceptance criteria of 1.66 seconds. As discussed in Inspection Report 50-302/99-07, the licensee had attributed a previous slow (1.65 seconds) end of cycle (EOC) drop time on this rod to bowing of the fuel assembly guide tube. Therefore the licensee had not repaired the CRDM since the rod would be in a newer, unbowed fuel assembly the next cycle. At the time, it was not fully recognized that the CRDM thermal barrier issue also contributed to the original slow EOC drop time. The BOC drop time of 1.67 seconds indicated that all four thermal barrier (TB) ball check valves were stuck. To correct the condition, the licensee withdrew and tripped rod 5-3 three times to flush the ball check valves. This was considered corrective maintenance and a final drop for the TS SR timing criteria yielded an acceptable result of 1.62 seconds.

The licensee performed an engineering analysis of previous operating cycle CRDM performance and industry operating experience to determine the potential for further degradation of the rod 5-3 drop time that would cause it to exceed the TS SR limit. The licensee considered their action in R11 to reset fuel assembly holddown springs and rearrange fuel assemblies effectively eliminated fuel assembly guide tube bowing from affecting drop times. Assuming the four TB ball checks were fully blocking flow, the only mechanism that could degrade drop times further would be lead screw corrosion which the licensee had discounted due to effective industry chemistry guidelines to prevent it and a lack of previous problems. Since the drop time of 1.67 seconds on one rod was well within the applicable safety analysis, which was based on a group average, the licensee concluded that rod 5-3 would remain capable of fulfilling its safety function and therefore was operable. The licensee documented their analysis in their CAP under PC 99-4314 with a corrective action to replace the rod 5-3 thermal barrier in the next outage. The inspectors reviewed the licensee determination, previous CRDM reactive analyses, and drop time test data, and found the licensee's conclusion to be conservative and acceptable. The inspectors verified the safety significance of the one slow rod was minimal and met regulatory requirements. The previous licensee decision not to repair the rod 5-3 CRDM in the refueling outage was appropriate given the information at that time. The licensee was evaluating the installation of continuous rod drop timing

instrumentation to allow for the monitoring of drop times during unexpected reactor trips to validate their analysis and the actual CRDM potential for degradation.

c. Conclusions

Beginning of cycle rod drop time testing identified that one rod was out of specification. The licensee exercised the rod to flush blocked thermal barrier flowpaths and retested it. A detailed analysis evaluated the potential for future degradation to support declaring the rod operable. The licensee's analysis also concluded that the safety significance was minimal.

E8 Miscellaneous Engineering Issues (92903)

E8.1 (Closed) LER 50-302/98-01-00: Systems, Structures, and Components Were Not Protected From The Dynamic Effects Of A Loss Of Coolant Accident. In 1997, the licensee identified several non-conforming conditions with Regulatory Guide 1.97 instrument lines that were subject to jet impingement and pipe whip damage from design basis accidents. Most of these were resolved by modifications to the instrument line or by License Amendment 181 which was issued July 27, 1999. The licensee issued Safety Assessment/Unresolved Safety Question Determination (SA/USQD) 99-0255 to address the remaining instrument outliers. The SA/USQD was approved by the licensee's onsite Plant Review Committee (PRC) on September 30, 1999. The inspector attended the PRC meeting and reviewed the approved SA/USQD. The inspector determined the SA/USQD adequately resolved the remaining outlier instrumentation lines. Consequently this item is closed. Although this item is a noncompliance with regulatory requirements, enforcement disposition was previously performed. For the reasons discussed in Inspection Report 50-302/97-21 and a subsequent supplement dated January 29, 1998, the licensee met the criteria for enforcement discretion per Section VII.B.2 of the NRC Enforcement Policy as described in NUREG-1600. Consequently this item was identified as an example of Non-Cited Violation (NCV) 50-302/97-21-01, Examples of Noncompliances in Design Control, 50.59 Evaluations, Procedure Adequacy, Reportability, and Corrective Actions That Are Subject to Enforcement Discretion.

V. Management Meetings

X1 Exit Meeting Summary

The inspection scope and findings were summarized on December 27, 1999. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

PARTIAL LIST OF PERSONS CONTACTED

Licensees

S. Bernhoft, Director, Nuclear Regulatory Affairs
J. Cowan, Vice President, Nuclear Operations
R. Davis, Assistant Plant Director, Operations

R. Grazio, Director, Nuclear Site and Business Support
G. Halnon, Director, Nuclear Quality Programs
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T. Taylor, Director, Nuclear Operations Training

INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 61726:	Surveillance Observations
IP 62707:	Conduct of Maintenance
IP 71001:	Licensed Operator Requalification Program Evaluation
IP 71707:	Plant Operations
IP 92902:	Followup - Maintenance
IP 92903:	Followup - Engineering

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

50-302/99-05-00	LER	ASME Code Section XI System Pressure Test Was Not Performed Due to Personnel Error. (Section M8.1)
50-302/98-01-00	LER	Systems, Structures & Components Were Not Protected From The Dynamic Effects Of A Loss Of Coolant Accident. (Section E8.1)

Discussed

50-302/97-21-01	NCV	Noncompliances in Design Control, 50.59 Evaluations, Procedural Adequacy/Adherence, Reportability, and Corrective Actions that are Subject to Enforcement Discretion. (Section E8.1)