UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

Report Nos.: 50-250/85-26 and 50-251/85-26

Licensee: Florida Power and Light Company
9250 West Flagler Street
Miami, Florida 33102

Docket Nos.: 50-250 and 50-251 License Nos.: DPR-31 and DPR-41

Facility Name: Turkey Point 3 and 4

Inspection Conducted: July 8 - August 19, 1985

Inspectors: S. Gunther for 9/3/85
T. A. Peebles, Senior Resident Inspector Date Signed

S. Gunther for 9/3/85
D. R. Brewer, Resident Inspector Date Signed

Approved by: Stephen A. Elrod 9/4/85
Stephen A. Elrod, Section Chief Date Signed
Division of Reactor Projects

SUMMARY

Scope: This routine, unannounced inspection entailed 260 direct inspection hours at the site, including 67 hours of backshift, in the areas of licensee action on previous inspection findings, licensee event reports (LER), Inspection and Enforcement Bulletin (IEB) followup, annual/monthly surveillance, maintenance observations and reviews, operational safety verification, engineered safety features (ESF) walkdown, plant events, and independent inspection.

Results: Violations - Failure to meet the requirements of Technical Specification (TS) 6.8.1, four examples; failure to meet the requirements of TS 6.8.3; and failure to meet the requirements of 10 CFR 50, Appendix B, Criterion XVI.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

C. M. Wethy, Vice President-Turkey Point
C. J. Baker, Plant Manager-Nuclear
J. P. Mendieta, Services Manager-Nuclear
*D. D. Grandage, Operations Superintendent-Nuclear
T. A. Finn, Operations Supervisor
*J. Webb, Operations Supervisor's Staff
*K. L. Jones, Technical Department Supervisor
B. A. Abrishami, Inservice Testing (IST) Supervisor
H. E. Hartman, Inservice Inspection (ISI) Supervisor
*D. Tomaszewski, Plant Engineering Supervisor
E. A. Suarez, Technical Department Engineer
D. A. Chaney, Corporate Licensing
*J. Arias, Regulation and Compliance Supervisor
R. L. Teuteberg, Regulation and Compliance Engineer
*R. Hart, Regulation and Compliance Engineer
*J. W. Kappes, Maintenance Superintendent-Nuclear
O. E. Suero, Assistant Superintendent, Electrical Maintenance
*F. H. Southworth, Engineering Department, Special Projects
R. A. Longtemps, Assistant Superintendent, Mechanical Maintenance
E. F. Hayes, Assistant Superintendent, Instrument and Control (I&C) Maintenance
V. A. Kaminskas, Reactor Engineering Supervisor
R. G. Mende, Reactor Engineer
R. E. Garrett, Plant Security Supervisor
P. W. Hughes, Health Physics (HP) Supervisor
R. M. Brown, Assistant Health Physics Supervisor
W. C. Miller, Training Supervisor
*P. J. Baum, Assistant Training Supervisor
*J. M. Donis, Site Engineering Supervisor
J. M. Mobray, Site Mechanical Engineer
L. C. Huenniger, Start-up Superintendent
*H. T. Young, Project Site Manager
M. J. Crisler, Quality Control (QC) Supervisor
R. H. Reinhardt, Quality Control Inspector
R. J. Earl, Quality Control Inspector
R. J. Acosta, Quality Assurance (QA) Superintendent
*W. Bladow, Quality Assurance Supervisor
T. P. Coste, Backfit Quality Assurance Supervisor
J. A. Labarraque, Performance Enhancement Program (PEP) Manager
*D. W. Hasse, Safety Engineering Group Chairman
*G. M. Vaux, Safety Engineering Group Engineer

T. C. Grozan, Licensing Engineer
*P. Pace, Licencing Engineer
G. Traczyk, Fire Protection Department
*J. Price, General Office, Plant Support Staff

Other licensee employees contacted included construction craftsmen, engineers, technicians, operators, mechanics, electricians and security force members.

NRC Inspectors

*D. Falconer
*H. Ornstein, AEOD
*D. Brewer

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized during management interviews held throughout the reporting period with the Plant Manager-Nuclear and selected members of his staff.

The exit meeting was held on August 9, 1985, with the persons noted in paragraph 1. The areas requiring management attention were reviewed. No new significant items were noted between the exit meeting and the end of the inspection period.

The three items identified as violations were:

Failure to meet the requirements of TS 6.8.1, in that the A and C auxiliary feedwater (AFW) pumps were not secured in accordance with procedures (paragraph 11); maintenance was performed on AFW flow control valve (FCV) 3-2833 without the use of a plant work order (PWO) (paragraph 8); maintenance activities were not properly documented during the replacement of a reactor protection system test switch (paragraph 8); and maintenance procedures were not adequately implemented during work on the A and B feedwater flow controllers, resulting in the controllers being wired to the wrong power supplies (paragraph 8), (250/85-26-01).

Failure to meet the requirements of TS 6.8.3, in that unauthorized temporary changes were made to the surveillance procedures for the AFW system (paragraph 7), (250/85-26-02).

Failure to meet the Criterion XVI of 10 CFR 50, Appendix B, in that water in the instrument air system adversely affected the operability of AFW FCV-3-2833 and the adverse quality condition was not promptly identified and corrected (paragraph 8), (250, 251/85-26-03).

Three unresolved items (UNR) were identified:

Evaluate the failure of the licensee to adjust the B AFW pump electronic overspeed setpoint after the pump was observed to trip repeatedly on electronic overspeed without exceeding the normal overspeed setpoint value. Evaluate the licensee's failure to test the mechanical and electronic overspeed trip setpoints on a periodic basis (paragraph 7), (UNR 250, 251/85-26-04).

Evaluate whether the nitrogen backup to instrument air for the AFW FCVs should be tested by actually operating the AFW pumps with the instrument air system isolated (paragraph 7), (UNR 250, 251/85-26-05).

Evaluate the advisability of calculating and rescaling the interim power range nuclear instrument currents so that installed annunciators will not indicate flux imbalances prior to obtaining post refueling 100 percent power physics data (paragraph 12), (UNR 250, 251/85-26-06).

An inspector followup item IFI (paragraph 13), (250, 251/85-26-07) was identified concerning whether Normal Operating Procedure 15608.1, Loss of Instrument Air, requires improved instructions on mitigation of the consequences of a loss of instrument air.

The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection. The licensee acknowledged the findings without dissenting comments.

3. Licensee Action on Previous Inspection Findings (92702)

a. Monthly update of Performance Enhancement Program

The PEP was reviewed to determine if commitments were being met. Status was discussed with the PEP Manager and with other members of management.

The facility upgrade project is on schedule. The contractor has continued pouring concrete support columns for the new administrative building, with the third floor beginning to be poured. The paving around the Health Physics building has been finished and the fencing to change the radiation control area has been moved. The Health Physics staff has moved into the new building.

The schedule for the PEP continues to be met within acceptable limits and all modifications have been cleared by the Region.

b. Previously Identified Items

(Closed) UNR 250/83-40-01, Reactor Decay Heat - Inadequate Procedure. The Off Normal Operating Procedure, (ONOP) 3208.1, Malfunction of Residual Heat Removal (RHR) System, was adequately revised on June 21, 1985. Another procedure to cover complete loss of RHR, 3/4-ONOP-050, Loss of RHR, dated June 12, 1985, was issued. These two ONOPs coupled with the procedure for operation of the RHR system, 3/4-OP-050, Residual Heat Removal System, dated May 29, 1985, are adequate for operator guidance to minimize the impact of malfunctions of the RHR system and to properly lineup the system. The UNR was opened by the Resident Inspector in November 1983 due to inadequate RHR procedures that contributed to the RHR system inoperability and temperature excursion event of October 1983. The licensee had agreed at that time to promulgate a normal operating procedure governing RHR system operations.

(Closed) IFI 250/84-14-06, Inverter Transfer Switch Maintenance and Responsibility. The licensee has assigned responsibility to the turbine operator to assure that inverter transfer switch maintenance is properly performed.

(Open) Violation 250, 251/85-02-02, Failure to Test the AFW Nitrogen System. The licensee, in response to the notice of violation, initially developed a Temporary Operating Procedure (TOP 158) and subsequently, a permanent Operations Surveillance Procedure (OSP) 075.3, AFW Nitrogen Backup System Operability Verification, to test the AFW nitrogen system. The procedures were developed and implemented to measure the bleed-down rate of the nitrogen bottles and verify that the low pressure alarms functioned; however, the licensee has not performed any testing that demonstrates that the nitrogen system will act as an adequate backup supply to the AFW FCVs upon loss of instrument air. A more detailed discussion of the discrepancy is found in paragraph 7 and relates to UNR 250, 251/85-26-05.

4. Unresolved Items

Three unresolved items were identified during this inspection (paragraphs 7 and 12). An unresolved item is a matter about which more information is required to determine whether it is acceptable or may involve a violation or deviation.

5. Licensee Event Report (LER) Followup (92700)

The following LERs were reviewed and closed. The inspector verified that: reporting requirements had been met, causes had been identified, corrective actions appeared appropriate, generic applicability had been considered, and the LER forms were complete. A more detailed review was then performed to verify that: the licensee had reviewed the event, corrective action had been taken, no unreviewed safety questions were involved, and no violation of regulations or TS conditions had been identified.

(Closed) LER 250/84-01. On January 8, 1984, Unit 3 experienced a reactor trip from 30 percent power. The root cause was determined to be a spurious signal which resulted in closure of the A steam generator (SG) feedwater FCV. This occurred while the Maintenance Department was troubleshooting the control circuit. The spurious closure of this valve or similar valves has not recurred.

(Closed) LER 250/84-02. On January 8, 1984, the Unit 3 reactor tripped from one percent power and a safety injection signal was received. The operators were opening the main steam isolation valves and were decreasing the differential pressure across the valves by rapidly opening the associated steam atmospheric dump valve. This caused a " high steam line flow" in the line, and the associated cooldown caused the "low primary average temperature " to complete the initiation. The licensee agrees that this is not good operating practice and has instructed the operators to heat up the secondary plant before trying to open the valves. No water was injected since the primary pressure was higher than the safety injection pump discharge pressure.

(Closed) LER 250/84-04. On January 4, 1984, while performing a surveillance on the AFW system, the A and C AFW pumps were started but did not produce the required flow. A unit shutdown per the TS should have been started due to their inoperability but was not. This was the subject of escalated enforcement action and was addressed in report 250/84-04.

(Closed) LER 250/84-06. On February 12, 1984, at 6:38 a.m., a Unit 3 reactor trip occurred from 100 percent power. A reduced feedwater flow transient resulted from the loss of the 3C 4160 volt bus. The root cause was the malfunction of a differential fault protection relay in the switchyard which tripped Unit 4. This event was the subject of escalated enforcement action and was addressed in report 250/84-09.

(Closed) LER 250/84-07. On February 16, 1984, the Unit 3 and Unit 4 reactors tripped from 100 percent power. A reduced feedwater flow transient resulted from the loss of the 4C 4160 volt bus. The root cause was a jarred relay caused by a bolt interfering with the opening of a switchgear door. This event was the subject of escalated enforcement action and was addressed in report 250/84-09.

(Closed) LER 250/84-08. On February 23, 1984, while performing a surveillance on the AFW system, the B pump was started but experienced flow oscillations and was declared out-of-service. Unit 3 was heating up the primary system and Unit 4's reactor was critical. A Unit 4 shutdown per the TS should have been started due to the inoperability but was not. This was the subject of escalated enforcement action and was addressed in report 250/84-09.

(Closed) LER 250/84-11. On March 23, 1984, Unit 3 experienced a turbine runback from 100 percent to 83 percent power caused by nuclear power range channel 42B detector reading low. Water was found in the cabling. The source of water was sealed and the instrument returned to service. This was discussed in report 250/84-11.

(Closed) LER 250/84-14. On April 24, 1984, a Unit 3 reactor trip occurred from 100 percent power. An operator was switching a vital bus inverter and de-energized the wrong inverter which caused a "rod drop runback" which resulted in a reactor trip on high reactor pressure. This was discussed in report 250/84-14.

(Closed) LER 250/84-15. On May 14, 1984, a Unit 3 reactor trip occurred from 100 percent power. Nuclear power range channel 35 power supply failed. This caused the vital bus breaker for nuclear instrument rack one to trip, de-energizing nuclear power range channel 41 and causing a "rod drop runback". The source of the failed power supply was a ground which has been repaired.

(Closed) LER 251/84-01. On February 12, 1984, at 9:45 a.m., a Unit 4 reactor trip occurred from 100 percent power. A reduced feedwater flow transient resulted from the loss of the 3C 4160 volt bus. The root cause was the malfunction of an electrical synchronism relay which allowed the erroneous closure of a de-energized bus feeder breaker during the restoration of power to Unit 3 following the Unit 3 reactor trip. This event was the subject of escalated enforcement action and was addressed in report 251/84-09. Additional information was to be sent in LER 251/84-03.

(Closed) LER 251/84-04. On March 7, 1984, a spurious signal from the containment radiation monitor caused the containment and control room ventilation systems to switch to the recirculation mode.

(Closed) LER 251/84-05. VOLUNTARY REPORT, The April 1984, ISI of the 4A SG feedwater nozzle disclosed a crack 270 degrees around the nozzle. A similar crack was found on the 4C SG, but it extended only 180 degrees. Both nozzles were replaced per plant change/modification (PC/M) 84-80. The nozzle-to-reducer areas were examined on the 4B SG and the 3A, 3B, and 3C SGs with no evidence of cracking found.

(Closed) LER 251/84-18. On August 29, 1984, while Unit 4 was at 100 percent power, the 4B Intake Cooling Water header was removed from service for a period in excess of that allowed per the TS. This event was the subject of escalated enforcement action and was addressed in report 251/84-30.

6. IE Bulletin Followup (92703)

The inspector discussed the requirements of pending IEBs with the licensee. Based on an analysis of licensee supplied information and documentation, the inspector closed all action items relating to the following bulletin:

(Closed - Units 3 and 4), IEB 80-12, Decay Heat Removal System Operability. The licensee responded to the IEB on June 11, 1980, indicating that their only open item to close out the IEB was to revise ONOP 3208.1, Malfunction of Residual Heat Removal (RHR) System, by June 30, 1980. The licensee improved ONOP 3208.1 adequately on June 21, 1985, and has written another procedure to cover complete loss of RHR, 3/4-ONOP-050, Loss of RHR, dated June 12, 1985. These two off-normal procedures, coupled with the procedure for normal operation of the RHR system, 3/4-OP-050, Residual Heat Removal System, dated May 29, 1985, are adequate for operator guidance to minimize the impact of malfunctions of the RHR system and to properly line up the system. An UNR (250/83-40-01) was opened by the resident inspector in November 1983 for the inadequate RHR procedures that contributed to the RHR system inoperability and the temperature excursion event of October 1983. The licensee had agreed at that time to promulgate a normal operating procedure governing RHR. That UNR is discussed in paragraph 3b of this report.

7. Monthly and Annual Surveillance Observation (61726/61700)

The inspectors observed TS required surveillance testing and verified: that the test procedures conformed to the requirements of the TS, that testing was performed in accordance with adequate procedures, that test instrumentation was calibrated, that limiting conditions for operation (LCO) were met, that test results met acceptance criteria and were reviewed by personnel other than the individual directing the test, that deficiencies were identified, as appropriate, and were properly reviewed and resolved by management personnel and that system restoration was adequate. For completed tests, the inspectors verified that testing frequencies were met and that tests were performed by qualified individuals.

The inspectors witnessed/reviewed portions of the following test activities:

Units 3 and 4 AFW Train 1 Operability Verification
Units 3 and 4 AFW Train 2 Operability Verification
Instrument Air System Dew point Sampling
AFW Pumps A, B and C Electronic Overspeed Testing
Unit 4 Reactor Protection System Logic Testing

On July 22, 1985, at 12:40 a.m., the AFW system received an automatic start signal due to a low level in the 3B SG. The A and C AFW pumps tripped on mechanical overspeed and, thus, were not immediately available to supply the SG. The B AFW pump trip-and-throttle valve cycled closed because its electronic overspeed setpoint was exceeded. The resultant loss of steam supply reduced the pump's rate of rotation allowing the trip-and-throttle valve to reopen as the electronic overspeed reset setpoint was reached. The B AFW pump trip-and-throttle valve cycled repeatedly in this manner.

Between 1:30 a.m. and 2:30 a.m. on July 22, the licensee performed testing on all three AFW pumps to establish operability subsequent to the overspeed trips. QA records of the testing, retained as required by Operations Surveillance Procedure (OSP) 3-OSP-075.1, Auxiliary Feedwater Train 1

Operability Verification, and 3-OSP-075.2, Auxiliary Feedwater Train 2 Operability Verification, were reviewed by the inspectors.

Numerous steps in each procedure were found to have been omitted. The omissions constituted changes to the intent of the procedures in that the acceptance criteria for pump operability were modified to be less restrictive than was previously acceptable. Pump discharge pressure was not monitored or recorded. Checks for noise and vibration were not made. The pumps were run for less than the required 15 minute interval, and they were not verified to be capable of delivering feedwater at the required rate of 375 gallons per minute (gpm) within three minutes of initial operation. Additionally, the procedural changes were not approved by two members of the plant management staff, they were not documented or reviewed by the Plant Nuclear Safety Committee (PNSC), nor were they approved by the Plant Manager-Nuclear within 14 days, as required.

TS 6.8.3 requires that temporary changes to procedures only be made provided that:

a. the intent of the original procedure is not altered;

b. the change is approved by two members of the plant management staff, at least one of whom holds a Senior Operator's License on the unit affected; and

c. the change is documented, reviewed by the PNSC and approved by the Plant Manager-Nuclear within 14 days of implementation.

Failure to comply with the requirements of TS 6.8.3 is a violation. This violation applies to Unit 3 only (250/85-26-02).

The licensee management was not aware that only modified versions of the surveillance procedures had been performed following the AFW pump trips of July 22, 1985. When informed of the discrepancy they directed that the tests be performed in their entirety. Since Unit 3 had been cooled down during that afternoon the additional testing was performed with the pumps aligned to Unit 4. The surveillance testing was observed by the Resident Inspector and was completed satisfactorily.

The July 22, 1985, electronic overspeed cycling of the B AFW pump trip-and-throttle valve prompted reviews of previous surveillance tests to determine the history of the problem. During a previous surveillance on June 23, 1985, the B AFW pump failed its operability test because it twice tripped on electronic overspeed. Consequently, PWO 8116 was issued to resolve the problem. The pump was determined to be running at 5980 revolutions per minute (rpm) instead of the desired 5900 rpm. The electronic overspeed setpoint should have been 6200 rpm. The B AFW pump governor was adjusted such that the turbine rotated at 5900 rpm. The pump was tested and it no longer tripped on electronic overspeed.

Discussions with technical support personnel indicated that the pump was not demonstrating large oscillations in speed. The maximum anticipated speed change, during normal operation, is about 100 rpm. Consequently, on June 23, 1985, the electronic overspeed for the B AFW pump could have been estimated to have occurred at no more than 6080 rpm. The licensee did not perform this extrapolation and after the overspeed symptom had been corrected, a verification of the actual setpoint was not performed.

Following the malfunction of the B AFW pump on July 22, 1985, the electronic overspeed setpoint was tested. The setpoint was found to be 6066 rpm which was 134 rpm too low. Apparently, the electronic overspeed trips on June 23 and July 22 were due to an incorrectly adjusted setpoint.

Discussions with the licensee revealed that their surveillance program did not require the routine periodic testing of either the electronic or mechanical overspeed setpoints. The electronic and mechanical overspeed setpoints had last been checked in December 1983, following installation of new governors. While not on a periodic schedule, the mechanical overspeed setpoints were subsequently tested in 1984 following governor maintenance.

On March 1, 1985, the Power Plant Engineering Department recommended that both the electronic and mechanical overspeed setpoints be tested annually (JPE-PTPO-231). On March 26, 1985, the Technical Department requested that the Procedure Upgrade Project (PUP) develop the procedures by December 31, 1985. As of August 12, work on the procedures had not begun. Since the overspeed testing process is not complicated and since the Technical Department did not request the procedures in the near future, a low priority was assigned to the task.

The failure of the licensee to have a program requiring periodic testing of the electronic and mechanical overspeed setpoints and the failure of the licensee, on June 23, 1985, to address the improper setting of the electronic overspeed setpoint on the B AFW pump is an UNR (250,251/85-26-04) pending additional review and analysis by the resident inspectors.

Early on July 24, 1985, the licensee returned Unit 3 to critical and performed AFW pump testing, including electronic overspeed testing, on the A and C pumps. Testing was observed by the Resident Inspector and was satisfactory on the A pump; the electronic overspeed testing portion was satisfactory on the C pump.

During this testing, when the FCV controllers were left in the automatic mode, the pump speed remained essentially constant at approximately 5900 rpm but the FCVs continuously cycled plus or minus ¼ inch around the 20 percent open position. The control board flow indications were rapidly cycling from 0 to 300 gpm, and each controller output was cycling from 0 to 60 percent demand. From the control room it appeared that the system was unstable. However, pump speed, which has only local indication, was stable. These unusual indications have existed for quite some time.

The control room operators do not feel comfortable with the system operating in the automatic mode. As a standard practice, the control room operators place the system in manual control as soon as possible following automatic system initiation. At the Resident Inspector's request the licensee demonstrated pump operability in the automatic mode by running each pump for five minutes. Although the pumps did not trip, the control room flow indications remained erratic and the licensee declined a request to perform the full surveillance procedure in the automatic mode.

The licensee maintains that there is no requirement that the system be capable of sustained automatic operation.

In Inspection Report 250,251/85-02, covering the period of January 1 to February 2, 1985, Violation 250,251/85-02-02 was issued because the licensee did not demonstrate, through periodic testing, that the AFW nitrogen system was capable of controlling the AFW FCVs. As an interim corrective action, the licensee developed TOP 158, Auxiliary Feedwater System Periodic Nitrogen Backup Test. The TOP is designed to measure the bleed-down rate of the nitrogen bottles and to verify that the low nitrogen pressure alarms are functional. Acceptance criteria require that the bleed-down rate be no more than 50 pounds per minute and that the low pressure alarm be received at 500 pounds per square inch.

A review of the TOP revealed that it does not verify that the bottled nitrogen system could actually operate the AFW FCVs during a simulated automatic system actuation. The TOP was only performed with the AFW pumps secured. The AFW FCVs were positioned 20 percent open in manual control. Cycling of the valves through their full range of motion, as would occur during an automatic system actuation, was not required. The bleed-down rate obtained was not representative of the rates which would exist if the valves were operating in the automatic mode or if the manual valve positions were frequently adjusted by the control room operator. Measuring the bleed-down rate and verifying that it was sufficiently slow to allow the timely replacement of depleted bottles provided only circumstantial evidence of system operability.

Discussions with licensee personnel revealed that the AFW system has at no time been physically operated with the instrument air system isolated and only nitrogen available to position the FCVs. This discrepancy constitutes an UNR (250,251/85-26-05) pending an evaluation of the licensee's AFW system test program.

8. Maintenance Observations (62703 & 62700)

Station maintenance activities of safety-related systems and components were observed/reviewed to ascertain that they were conducted in accordance with approved procedures, regulatory guides, industry codes and standards and in conformance with TS.

The following items were considered during this review, as appropriate: that LCOs were met while components or systems were removed from service; that approvals were obtained prior to initiating the work; that activities were accomplished using approved procedures and were inspected as applicable; that procedures used were adequate to control the activity; that troubleshooting activities were controlled and repair record accurately reflected what took place; that functional testing and/or calibrations were performed prior to returning components or systems to service; that QC records were maintained; that activities were accomplished by qualified personnel; that parts and materials used were properly certified; that radiological controls were implemented; that QC holdpoints were established and observed where required; that fire prevention controls were implemented; that outside contractor force activities were controlled in accordance with the approved QA program; and that housekeeping was actively pursued.

The following maintenance activities were observed and/or reviewed:

Unit 3 AFW FCV-3-2833 repair
Unit 3 and Unit 4 instrument air system repair
Unit 3 reactor protection system test switch S-5 replacement
3A and 3B SG feedwater controller rewiring
Instrument inverter replacement
Reactor protection system logic contact cleaning (PWO 7534)
B AFW pump electronic overspeed setpoint adjustment
AFW FCV air system cleaning
AFW FCV-3-2817 positioner calibration

During this inspection period, the licensee failed to comply with the requirements of TS 6.8.1, in the area of maintenance activities, on three occasions.

a. On July 14, 1985, during Unit 3 AFW surveillance testing, FCV-3-2833 failed in the open position. The valve was repaired without the issuance of a PWO. Administrative Procedure (AP) 0190.19, dated May 21, 1985, entitled Control of Maintenance on Nuclear Safety Related and Fire Protection Equipment, requires that a PWO be issued for maintenance activities. Section 8 of the procedure requires that QC and supervisory reviews be performed prior to beginning the maintenance and that the activities be thoroughly documented on the PWO.

   Contrary to the above, on July 14, 1985, maintenance was performed on Unit 3 AFW FCV-3-2833 and a PWO was not issued for the activity. QC and supervisory reviews of the maintenance were not performed and the maintenance was not documented.

b. On July 30, 1985, test switch S-5 was replaced in Unit 3 reactor protection rack 41. AP 0190.19 requires, in section 8, that the conduct of maintenance activities be thoroughly documented on a PWO.

Contrary to the above, on July 30, 1985, maintenance activities were not thoroughly documented during the replacement of switch S-5 in reactor protection system rack 41 of Unit 3, in that erroneous and incomplete information was recorded on PWO 7546. The PWO documentation section did not indicate that wiring changes had been made on the switch prior to its final installation.

At 11:45 p.m. a QC Inspector was contacted by telephone and informed of the need to replace the switch. The replacement plan was discussed and verbal approval was obtained. A replacement switch, part number 40302-501, was obtained from supply and installed. Subsequent reactor protection system testing indicated that the problem was not completely corrected and switch S-5 was not operating properly. Troubleshooting was resumed but the QC Inspector was not informed that the replacement of switch S-5 failed to correct the observed discrepancies. The I&C technician removed switch S-5 and determined that it contained normally closed rather than the required normally open contacts. The I&C technician, without authorization, reversed the contacts on S-5 and reinstalled the switch. The entry recorded on the PWO states, "the correct switch was obtained and installed," which is an inaccurate statement. Switch S-5 was initially installed without independent verification of the wiring installation. At the request of the NRC Inspectors, the verification was performed and the switch, which is not listed as a safety-related component, was found to be correctly installed.

This problem occurred because the QC Department was not appraised of all aspects of the switch contact discrepancy. Consequently, it could not institute programmatic protections to assure the quality of the maintenance. The I&C technician's actions were contrary to numerous requirements of AP 0190.19. The QC Department has issued nonconformances which require the Maintenance Department to address the failure to implement AP 0190.19.

c. On August 1, 1985, the Unit 3 reactor tripped due to a loss of 120 volt vital instrument panel 3P08. Several hours after the unit stabilized the Resident Inspector verified that the on-shift reactor operators felt the plant had responded in a manner consistent with the description found in 3-ONOP-003.8, Loss of 120 Volt Vital Instrument Panel 3P08. While discussing the plant response, the operators indicated that the A SG feedwater regulating valve hand/auto controller was operated in manual following the loss of power. Since 3-ONOP-003.8 indicates that the A SG feedwater regulating valve hand/auto controller is deenergized on loss of 3P08, a review of the apparent problem was initiated.

It was determined that the hand/auto control stations for the A and B feedwater regulating valves were each wired to opposite power supplies. Consequently, the as-built controller wiring was connected contrary to approved drawings. The licensee determined that the crossed wiring probably occurred during maintenance activities on the controllers on

some previous date. The date could not be readily determined. Consequently, the problem existed for an unknown length of time.

Previously, on June 13, 1985, the licensee had performed testing of the Unit 3 instrument power supplies to determine whether electrical drawings were accurate. The testing was documented on PWO 7210. During the testing, breaker 7 on power supply 3P08 was opened and the B SG feedwater regulating valve hand/auto controller was observed to lose power; however, approved drawings show that the A SG feedwater regulating valve hand/auto controller should have lost power instead. The discrepancy was not detected by the licensee until after the trip on August 1, 1985.

Section 5.1 of ANSI N18.7-1972 and section 9 of Appendix A of USNRC Regulatory Guide 1.33 require that maintenance that can affect the performance of safety-related equipment shall be properly planned and performed in accordance with written procedures, documented instructions or drawings appropriate to the circumstances.

Contrary to the above, maintenance procedures for the 3A and 3B feedwater regulating valve hand/auto flow controllers (CV-2900 and CV-2901, respectively) were not adequately implemented in that the controllers were wired to power supplies other than those specified in the approved drawings. The discrepancy was corrected on August 2, 1985.

The events discussed in items a through c occurred because the licensee failed to comply with TS 6.8.1 in that procedures were not adequately implemented. Items a through c document three of the four examples constituting Violation 250/85-26-01. The other example is discussed in paragraph 11.

The following paragraphs address a sequence of events and maintenance activities concerning the instrument air-AFW interface:

d. At 11:43 p.m., on July 21, 1985, following a Unit 3 reactor trip, a low-low level in the B S/G caused an auto-start of the AFW system. The AFW system functioned normally, and at 11:50 p.m. the reactor control room operator placed the normal feedwater system in service and began to secure the AFW system. He attempted to close FCV-3-2833 (AFW train 2 flow control valve to the C SG), but the valve was failed in the full-open position. The I&C Department was notified of the problem.

At 12:40 a.m., on July 22, 1985, a low-low level in the B SG occurred because the B main feedwater bypass valve, FCV-3-489, failed to respond to demand signals from the control room. The low-low level signal caused the AFW system to auto-start. The A and C AFW pumps, both lined up to train 1, auto-started and promptly tripped on mechanical overspeed. The B AFW pump, lined up to train 2, auto-started and cycled on electronic overspeed. Electronic overspeed cycling resulted in the trip-and-throttle valve shutting when the pump's turbine reached the overspeed setpoint and then opening as the turbine slowed to the

overspeed reset setpoint. The cycling was repetative and continued until the AFW system was secured.

The circumstances surrounding the mechanical tripping of the A and C AFW pumps are discussed in paragraph 11. The cycling of the B AFW pump is discussed in paragraph 7.

At 4:00 a.m., a high level in the C SG occurred because the C feedwater bypass valve, FCV-3-499, failed to respond to a remote manual close signal initiated by the reactor control room operator. The high level signal tripped the operating main feedwater pump and auto-started the AFW system. The AFW system responded normally except for FCV-3-2833, which had remained full-open since failing earlier.

At 4:40 a.m., a cooldown of Unit 3 was begun. FCV-3-2833 was still out of service. TS 3.8 provides no LCO or action statement when a unit with an AFW problem is operating below two percent power. Since Unit 3 was subcritical when FCV-3-2833 failed, no LCO or action statement existed and a cooldown was begun under TS 3.0.1.

The transients of July 22, 1985, revealed valve operability discrepancies for AFW train 2 FCV-3-2833, and both main feedwater bypass valves, FCV-3-489 and FCV-3-499. In each case the valves failed to respond to remote positioning signals initiated from the control room.

The Resident Inspectors reviewed QC records documenting that FCV-3-2833 and FCV-3-2832 received maintenance after malfunctioning during testing on July 14, 1985. The Plant Supervisor's Log documents that FCV-3-2833 did not operate properly. Maintenance personnel and members of the Technical Department staff stated that FCV-3-2833 was cleaned because it stuck open. Following cleaning it still did not fully close until its positioner was re-zeroed. Water was found in the instrument air supply line. FCV-3-2832 failed to reposition in response to remote signals until after its orifice plunger was exercised to unblock an obstructed instrument air bleed-off line.

On July 22, 1985, I&C technicians removed, cleaned and recalibrated the FCV-3-2833 current-to-pneumatic controller. Upon controller reinstallation, the valve was stroked and immediately stuck in the open position. Investigation revealed that water in the valve's instrument air line precluded proper valve operation. The water was blown out of the instrument air line and then the valve was stroked successfully and returned to service (reference PWO 7491).

Early on July 24, 1985, the licensee started the Unit 3 reactor and performed AFW system surveillance testing. FCV-3-2833 and FCV-3-2832 failed to reclose at the end of the A AFW pump testing. The licensee determined that train 1 of the AFW system was inoperable due to the failure of the valves and Unit 3 was placed in hot standby.

Later on July 24, the inspectors informed maintenance personnel that Unit 4 instrument air dessicant dryer had a high humidity alarm and was not operating properly. An evaluation revealed that the dryer system was improperly aligned. Several components were found to be inoperable and a PWO was submitted to address the discrepancies.

Since the Unit 4 instrument air system supplies air to Unit 3 train 2 AFW FCVs, including FCV-3-2833, and since the Unit 4 instrument air dryer was observed to be operating with unattended high humidity alarms, the licensee checked the Unit 4 AFW FCVs for water in the instrument air lines. The instrument air line for one Unit 4 train 1 AFW FCV was found to contain water. The Unit 4 instrument air system supplies both Unit 4 train 1 and Unit 3 train 2 AFW FCVs.

On the afternoon of July 24, 1985, the licensee began to correct the discrepancies associated with the Unit 4 instrument air system. The decision was made to take local dew point measurements at the AFW FCVs.

On July 25, 1985, the filters which had been removed from each units' instrument air system were observed to have been degraded. The Unit 4 oil/water separator filter was excessively wet, and the dryer outlet filter had white/gray, light powder on it. The filters had been changed during quarterly replacement in June 1985.

The Unit 4 instrument air dryer maintenance effort resulted in the replacement of the selector switches, the cycle timer and the three-way valve limit switch. The failed limit switch had apparently precluded energizing the drying heaters. The Unit 4 dryer outlet dew point reading was determined to be +53 degrees Fahrenheit (F). This constituted an excessively moisture ladden air output. The dryer outlet dew point should have been on the order of -30 degrees F.

On the afternoon of July 25, 1985, the Unit 3 AFW valve current-to-pneumatic converters and positioner air lines were cleaned. Some foreign matter had been cleaned out of each valve control mechanism. The train 2 valves had dew points at their instrument air supply connections of +14 degrees F to +20 degrees F and the train 1 valve dew points were +60 degrees F to +51 degrees F. Following a fifteen minute air system blowdown, the train 2 valves had dew points of +52 degrees F to +55 degrees F. The dew point values were indicative of moisture in the instrument air system.

The licensee changed the dessicant in Unit 4 instrument air dryer because it was brown and had released the white/gray powder found in the downstream filters. These were indications that the desiccant may have lost a substantial ability to absorb moisture. Some loose metal brackets were discovered in the bottom of the Unit 4 dryer and an evaluation was begun to determine their significance.

Discussions between NRC Region II management and the licensee resulted in mutually acceptable criteria for establishing and verifying satisfactory instrument air system operability as follows:

- Clean and flush the controls for the AFW valves on Unit 4 (clean/flush/calibrate/retest).
- Take dew points on all six Unit 4 AFW valves, compare with acceptance criteria and evaluate any discrepancies.
- Blowdown low points and valves of the instrument air system on a systematic basis (list locations/length of time of blowdown /when done).
- Blowdown AFW valve regulators, including main feedwater bypass valves (list valves/length of time of blowdown /when done).
- Take periodic dew point readings at each dryer outlet and maintain outlet dew points within acceptable ranges.
- Evaluate and repair, as necessary, the Unit 3 instrument air system.

The licensee's evaluation of the valve failures occurring on July 22, 1985, concluded that water in the instrument air system had prevented the valves from operating. The licensee was aware that water was contained in the instrument air system but was not aware that the water would adversely affect the operation of the safety-related AFW FCVs. When water was observed in the instrument air supply to FCV-3-2833, on July 14, 1985, the discrepancy was only symptomatically addressed. The lack of management action at that time was influenced by the informal and undocumented nature of the July 14 maintenance (paragraph 8.a.).

10 CFR 50, Appendix B, Criterion XVI, as implemented by Florida Power and Light Topical Quality Assurance Report (FPL-NQA-100A), Revision 7, TQR 16.0, Corrective Action, requires, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected.

Florida Power and Light Quality Assurance Manual, Quality Procedure (QP) 16.1, Revision 8, delineates requirements for assuring that conditions adverse to quality are corrected.

AP 0190.13, dated May 21, 1985, entitled Corrective Action for Conditions Adverse to Quality, itemizes the mechanisms by which conditions adverse to quality are promptly identified, tracked and corrected.

Contrary to the above, the licensee failed to establish measures to assure that conditions adverse to quality were promptly identified and corrected, in that the licensee's corrective action program was implemented in a manner which allowed symptom correction without requiring the identification, evaluation and correction of the source problem. Consequently, on July 14, 1985, and again on July 22, 1985, water was drained from the instrument air supply line for AFW FCV-3-2833 to restore valve operability while no effort was made to locate, evaluate or eliminate the source of the water. Failure to prevent water from entering the instrument air system resulted in an additional malfunction of FCV-3-2833 on July 24, 1985. The licensee did not address the degraded status of the instrument air dryers and heaters until 10 days after the air system was known to contain water. By that time AFW FCV-3-2833 had failed on three separate occasions.

The failure to meet the requirements of 10 CFR 50, Appendix B, Criterion XVI is a Violation 250,251/85-26-03.

9. Operational Safety Verification (71707)

The inspectors observed control room operations, reviewed applicable logs, conducted discussions with control room operators, observed shift turnovers and confirmed operability of instrumentation. The inspectors verified the operability of selected emergency systems, verified that maintenance work orders had been submitted as required and verified that followup and prioritization of work was accomplished. The inspectors reviewed tagout records, verified compliance with TS LCOs and verified the return to service of affected components.

By observation and direct interviews, verification was made that the physical security plan was being implemented.

Plant housekeeping/cleanliness conditions and implementation of radiological controls were observed.

Tours of the intake structure and diesel, auxiliary, control and turbine buildings were conducted to observe plant equipment conditions including potential fire hazards, fluid leaks and excessive vibrations.

The inspectors walked down accessible portions of the following safety-related systems on Unit 3 and Unit 4 to verify operability and proper valve/switch alignment:

Emergency diesel generators
Auxiliary feedwater
Component cooling water
4160 volt and 480 volt switchgear
Radiological waste processing and storage
Control room vertical panels
High head safety injection

Containment spray system
120 volt ac inverters
Battery power supplies
Spent fuel storage
Charging pumps

No violations or deviations were identified.

10. Engineered Safety Features Walkdown (71710)

The inspector verified operability of the AFW system, which is common to Units 3 and 4, by performing a complete walkdown of the accessible portion of the system. The following items were specifically reviewed and/or observed as appropriate:

a. that the licensee's system lineup procedures matched plant drawings and the as-built configuration;

b. that the equipment conditions were satisfactory and items that might degrade performance were identified and evaluated (e.g. hangers and supports were operable, housekeeping was adequate);

c. that instrumentation was properly valved-in and functioning and that calibration dates were not exceeded;

d. that valves were in proper position, breaker alignment was correct, power was available, and valves were locked/lockwired as required;

e. that local and remote position indications were in agreement and remote instrumentation was functional; and

f. that breakers and instrumentation cabinets were free of damage and interference.

During the walkdown of the AFW system, the following discrepancies were identified:

g. Numerous AFW FCVs were found to have instrument air leaks along the upper cylinder housing. PWOs were written documenting the discrepancies. The licensee has begun an evaluation of the leakage and its effects on valve operability. Recent testing revealed no diminished valve control capabilities due to instrument air leakage.

h. A broken connector pin was found on the positioner for Unit 3 train 1 valve 2816. The pin was promptly replaced.

i. The connector pins on all 12 Unit 3 and Unit 4 AFW FCV positioners lacked grease. While no specific preventive maintenance document requires pin greasing, the valve technical manual states that each pin should be greased upon installation. The licensee plans to keep these pins greased in the future to help preclude binding.

j. Several AFW FCV positioner arms were improperly aligned causing the arms to scrape their associated stem lifting arms. While binding had apparently not occurred, visual evidence of physical contact was present. The licensee has issued PWOs to align the positioner arms in parallel with the stem lifting arms.

When informed of these discrepancies the licensee initiated prompt corrective action.

No violations or deviations were identified.

11. Plant Events (93702)

An independent review was conducted of the following events.

On July 16, 1985, a subcritical trip of the Unit 3 reactor occurred due to the loss of the 3C vital instrument bus inverter. The loss de-energized source range nuclear instrument N-31 causing a spurious source range high flux trip. Shutdown control rod banks A and B automatically entered the core. Control rod banks A through D were already fully inserted at the time of the trip. Fuse F-6 was replaced and the inverter was returned to standby service. The licensee is currently expediting the replacement of all 12 inverters with a newer, more reliable model.

On July 17, 1985, the Unit 4 reactor tripped from 100 percent power due to the loss of the 4D inverter. A current limiting circuit was found to have failed. The circuit was replaced and the inverter was restored to service. The failure of vital instrument inverters is recognized as a repetative problem. The inverters are being replaced on an expedited schedule.

On July 21, 1985, the Unit 3 reactor tripped from 100 percent power due to a spurious protection relay actuation. The unexpected relay actuation was attributed to a lightning strike near the Unit 3 turbine deck. During the resultant transient, the AFW system and the main feedwater system did not respond properly, as discussed in paragraphs 6 and 7, respectively. Following the first initiation of the AFW system the A and C AFW pumps were improperly secured. The pumps were secured using procedure 3-OSP-075.1, Auxiliary Feedwater Train 1 Operability Verification. Sections 7.1 and 7.2 of the procedure specify that the trip-and-throttle valve for each pump be open prior to exercising the governor oil knob. On July 22, 1985, shortly after 12:00 am, the A and C AFW pump governor oil knobs were exercised prior to opening the trip-and-throttle valve for each pump. Subsequently, when the trip-and-throttle valves were opened, each governor became misadjusted due to additional pump rotation. Consequently, the A and C AFW pumps tripped on mechanical overspeed when next called upon to operate. Failure to secure the A and C AFW pumps in accordance with procedures is an example of Violation 250/85-26-01. Additional examples are discussed in paragraph 8.

On July 24, 1985, the Unit 3 reactor was shutdown due to the failure of AFW FCV-3-2833 and FCV-3-2832 to operate properly. Water in the instrument air system was found to have contributed to the degraded status of the valves.

The repair of the instrument air system and the AFW FCVs is discussed in paragraphs 7 and 8.

On July 26, 1985, preparations were begun to again shut down Unit 3 following the failure of AFW FCV-3-2817 to pass an operability test. The valve positioner was adjusted and the valve was tested satisfactorily prior to the reactor being shut down. Preparations to shut down the reactor were terminated.

On July 29, 1985, the Unit 3 reactor tripped from 100 percent power due to dirty relay contacts in the reactor protection system cabinets. The power range nuclear instrument relay contacts for high flux were cleaned. While no specific dirty relay could be identified, additional system testing led the PNSC to conclude that a dirty relay contact existed and contributed to the trip.

On August 1, 1985, the Unit 3 reactor tripped from 32 percent power due to the failure of the B spare inverter. Several circuit cards were replaced due to failed components. The inverter was returned to service. The replacement of the inverters is progressing on an expedited schedule.

12. Independent Inspection

During the report period the inspectors routinely attended meetings with licensee management and monitored shift turnovers between shift supervisors (Plant Supervisor-Nuclear [PSN]), shift foremen (Nuclear Watch Engineers [NWE]) and licensed control room operators (CRO). These meetings provided a daily status of plant operating and testing activities in progress as well as a discussion of significant problems or incidents. Based on these discussions, the inspectors reviewed potential problem areas to independently assess their importance to safety, the proposed solutions, improvement and progress, and adequacy of corrective actions. The inspector's reviews of these matters were not restricted to the defined inspection program. Independent inspection efforts were conducted in the following areas:

Axial flux difference off-normal procedures
Quadrant power tilt off-normal procedures

From July 26 through 29, 1985, Unit 3 control room annunciators indicated that the allowed axial flux band of five percent was being exceeded. The annunciators, labeled Axial Flux > five percent and Axial Flux > five percent > one hour, are controlled by the digital data processing system (DDPS). The annunciators were considered out of service by the CROs because the DDPS was known to not have the correct axial flux limits installed. The correct limits were promulgated on June 12, 1985. Due to an oversight, these limits were not installed in the DDPS axial flux program until after the Unit 3 reactor was operated at power. CROs compensated for the erroneously alarming annunciators by recording indicated axial flux as required by TS 3.2.8 and comparing the values to the correct limits. The installation of the correct axial flux limits in the DDPS takes only a short

period of time. Failure to install the limits resulted in the annunciators being needlessly out of service. The problem was corrected on August 1, 1985.

Between August 4 and 8, 1985, the upper and lower quadrant power tilt annunciators were alarmed in the Unit 3 control room. The alarms were considered erroneous because the power range nuclear instrument currents had not been adjusted to reflect the results of post refueling physics testing. The licensee delayed the calculation of the correct currents until 100 percent power, equilibrium xenon flux maps were obtained. Consequently, the power range nuclear instruments were providing incorrect radial flux outputs between August 4 and 8, 1985. The licensee performed flux maps at 30, 50 and 75 percent power prior to August 4, and these maps indicated that there was not an actual flux imbalance in either the axial or radial directions.

It may be possible to extrapolate approximate power range nuclear instrument currents from the lower power flux maps. The resultant interim values would represent a more accurate approximation of the necessary currents than is obtained by using the currents from the pre-refueling core. The interim values could be accurate enough to prevent the unnecessary alarming of the axial and radial alarm circuitry prior to completing the 100 percent equilibrium xenon flux calculations. The failure of the licensee to use interim currents to preclude unnecessary flux alarms is an UNR (250,251/85-26-06) pending further evaluation of the licensee's low power physics testing program.

13. Office of Analysis and Evaluation of Operational Data (AEOD) Visit

From August 6 to 9, 1985, a representative of the Office of the AEOD accompanied by a Region II inspector conducted a special team site visit to gather information on the facts and circumstances surrounding the AFW malfunction which occurred on July 22, 1985. Details of this event are described elsewhere in this report. The team focused its efforts on the overspeed trips which affected the operability of the AFW pumps and the degradation of the instrument air system which affected the operability of safety-related plant components. Information obtained by the team will be utilized to develop AEOD case studies of instrument air systems and overspeed trips of turbine driven pumps.

One area of concern was identified by the team for subsequent inspection followup. Normal Operating Procedure (NOP) 15608.1, Loss of Instrument Air, provides the operator with instructions to be followed in the event of a loss of instrument air. The general methodology of the procedure directs the operator to restore instrument air header pressure by alternate methods. The procedure does not provide adequate instructions for the operations necessary to mitigate the consequences of a loss of instrument air and the impact of this transient on plant components, i.e., no list of affected components and their failure modes is provided.

The licensee acknowledged the above concern and stated that an evaluation of NOP 15608.1 would be conducted to determine if improvements to the procedure are necessary. Review of the licensee's efforts in this area will be identified as an IFI (250, 251/85-26-07).