U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos: 50-335, 50-389
License Nos: DPR-67, NPF-16

Report Nos: 50-335/99-02, 50-389/99-02

Licensee: Florida Power & Light Co.

Facility: St. Lucie Nuclear Plant, Units 1 & 2

Location: 6351 South Ocean Drive
Jensen Beach, FL 34957

Dates: March 7 - April 17, 1999

Inspectors: T. Ross, Senior Resident Inspector
D. Lanyi, Resident Inspector
G. Warnick, Resident Inspector

Approved by: L. Wert, Chief
Reactor Projects Branch 3
Division of Reactor Projects

Enclosure

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EXECUTIVE SUMMARY

St. Lucie Nuclear Plant, Units 1 & 2
NRC Inspection Report 50-335/99-02, 50-389/99-02

This integrated inspection included aspects of licensee operations, engineering, maintenance, and plant support. The report covers a 6-week period of inspections by the resident inspectors.

Operations

- Operations personnel and plant equipment performed well during the Unit 2 shutdown required by Technical Specification 3.0.3 and during the subsequent power ascension. Management decisions were conservative and clearly communicated to the operating crews. Crew turnover and briefings were accomplished in a professional and informative manner. Strong control room supervision was observed. (Section O1.2)

- A Non-Cited Violation was identified for failing to perform written safety evaluations to determine if changes to the positions of containment isolation valves described in the Updated Final Safety Analysis Report involved unreviewed safety questions. (Section O3.1)

Maintenance

- Application of lessons learned and effective teamwork during the planning, preparation, and implementation of work, resulted in successful repairs of emergency core cooling system header leaks while minimizing the out of service time of important safety systems. (Section M1.2)

- Surveillance testing of the Unit 1 sodium hydroxide tank vacuum breaker check valves was conducted in a methodical, step-by-step manner. The test engineer immediately notified the control room and wrote a three-day condition report when one of the check valves failed to open. Compensatory measures to restore operability were prompt and effective. Engineering dispositions of the applicable condition reports were thorough and comprehensive. (Section M1.3)

- A Non-Cited Violation was identified for failure to complete the required steam generator tube inspections during the Unit 2 Cycle 11 refueling outage. This condition was identified and reported by the licensee in Licensee Event Report (LER) 50-389/98-008-00. (Section M8.1)

Engineering

- The Root Cause Team assembled to coordinate troubleshooting and repair activities for the 2B Qualified Safety Parameter Display System used good teamwork to systematically determine the root cause of the equipment failure. Communications were effective between team members. (Section E2.1)

- An Apparent Violation was identified for design control issues involving fire protection for cables associated with several Unit 2 shutdown cooling suction isolation motor operated valves. This condition was identified and reported by the licensee in Licensee Event Report (LER) 50-389/ 98-001-00. (Section E8.1)

Plant Support

- Routine radiological surveys were completed by knowledgeable technicians using efficient and conservative methods. (Section R4.1)

- The annual emergency preparedness exercise scenario was well crafted and challenged the emergency response organization. Communications and coordination between the emergency response facilities were effective. Licensee declarations of progressively higher emergency action level classifications were consistent with implementing procedures and the simulated deterioration of plant conditions. (Section P1.1)

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Report Details

Summary of Plant Status

Unit 1 remained at essentially full power for the entire report period.

Unit 2 operated essentially at full power for the entire report period with one exception. On April 6, the licensee identified several small leaks on both emergency core cooling system suction headers (see Sections O1.2 and M1.2). The licensee entered Technical Specification 3.0.3 and started a unit shutdown. Prior to completing the reactor shutdown, the licensee completed an evaluation and declared both headers operable. Unit 2 was held at 50% until April 11 when, upon completion of repairs, the unit was returned to full power.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

Using Inspection Procedure 71707, the inspectors conducted frequent reviews of plant operations including observations of the Main Control Room. In general, the conduct of Operations met management's expectations. Pre-job briefings and plant evolutions were conducted in a professional and safety-conscious manner. Shift turnovers adequately prepared the oncoming crew to assume control of the units. Operators were consistently alert and attentive to changing plant conditions, especially control room alarms. Their knowledge of plant status, system configuration, and existing alarms was excellent, with one exception.

On March 24, 1999, an inspector questioned operators regarding the status of the Unit 1 Reactor Internals Vibration Monitor (IVM) located in the control room. The shift crew indicated they were unfamiliar with the condition, status, or purpose of the IVM. Further investigation on their part identified that the IVM had been turned off many years ago (approximately 1985). Current Technical Specifications and procedures do not require the system to be operable. The inspector noted that the control room annunciator alarm window and the response procedure had not been revised to reflect the system status. The inspector discussed this issue with the Assistant Nuclear Plant Supervisor and with Operations management. However, during the exit meeting on April 20, it was identified that the efforts taken to address the apparent abandonment of the Unit 1 IVM were incomplete. Two condition reports were subsequently initiated. Condition Report 99-0500 was issued to address the status of the IVM, and Condition Report 99-0501 was issued to address why no condition report was written when the issue was first identified a month earlier. The licensee subsequently concluded that they had not previously completed the process to abandon this equipment and initiated CR 99-0601 to address that aspect. Although Operations did not have a questioning attitude toward the status of the IVM system, this issue did not represent a significant condition adverse to quality. No violations of regulatory requirements were identified.

Additional specific observations are discussed in Section O1.2 below.

O1.2 Unit 2 Maneuvering Due to Entering and Exiting Technical Specification 3.0.3

a. Inspection Scope (71707)

An inspector observed control room activities during a required shutdown of Unit 2 pursuant to Technical Specifications 3.0.3 for two inoperable trains of the emergency core cooling system. The inspector observed both the unit power reduction and subsequent power ascension, including crew briefings and system maneuvers.

b. Observations and Findings

On April 6, during a routine inspection, the licensee identified evidence of through-wall leakage on both the "A" and "B" emergency core cooling system (ECCS) suction headers of Unit 2 (See Section M1.2 for further details). Several small, localized areas of apparent boric acid buildup were observed on both headers. Samples were sent to Chemistry for analysis. After the samples were confirmed to be boric acid, both ECCS headers were declared inoperable and the licensee entered TS 3.0.3. Operations was briefed and an orderly shutdown of the unit was commenced. The crew briefing was concise and informative. The Assistant Nuclear Plant Supervisor effectively used the short time it took Chemistry to analyze the powder samples to prepare the paperwork for unit shutdown and retrieve extra operators from training.

The shutdown was well controlled. Reactivity manipulations were methodical and completed in accordance with management's expectations. Communication between the turbine operator and the reactor operator were clear and concise. Overall command and control of the evolution was evident. The inspector noted the control room area became noisy at times due to additional non-essential personnel. The extra noise and people did not distract the operators or adversely affect their ability to operate the plant.

After about five and half hours into the shutdown, the Nuclear Plant Supervisor was informed by the Plant General Manager that the Facility Review Group had approved an interim engineering disposition of the through-wall leaks. This interim disposition concluded the current condition of the ECCS piping was acceptable and determined that both headers were operable. The plant was stabilized at about 28 percent power, as Operations prepared to increase power. Several briefings by management were conducted with the operating crew to ensure they understood current conditions, Engineering's interim disposition, and plans to restore the ECCS piping. These briefs were sufficiently detailed to answer the operating crew's questions. Furthermore, senior management decided to maintain reactor power at 50 percent until the ECCS suction piping was repaired. This was an administrative decision on the part of Florida Power and Light management and there were no technical concerns about increasing power further.

The inspector observed operator turnover between day shift and peak shift. All personnel observed performed their turnover tasks professionally and thoroughly. All pertinent items were discussed including observed problems and planned evolutions. The oncoming shift was well informed upon assuming their duties.

Prior to increasing power to 50%, the peak shift Assistant Nuclear Plant Supervisor briefed the operating crew. Again, the inspector found this briefing to be concise and informative. Crew performance during the power escalation was good. Communication among the crew members was appropriate, and proper control of the primary and secondary plants was observed. Reactor Engineering support was evident throughout the downpower and power ascension evolutions.

c. Conclusions

Operations personnel and plant equipment performed well during the Unit 2 shutdown required by Technical Specification 3.0.3 and during the subsequent power ascension. Management decisions were conservative and clearly communicated to the operating crews. Crew turnover and briefings were accomplished in a professional and informative manner. Strong control room supervision was observed.

O2 Operational Status of Facilities and Equipment

O2.1 General Tours of Safety-Related Areas (71707)

The inspectors performed tours of safety-related areas to examine the physical condition of plant equipment and to verify that safety systems were properly maintained and aligned. These tours included the accessible portions of safety-related structures, systems, and components. Overall material condition was good. Several minor equipment and housekeeping problems were identified by the inspectors and referred to the licensee for resolution. The licensee either immediately corrected these items or placed them in the corrective action program.

O2.2 Engineered Safety Feature System Walkdowns (71707)

The inspectors used Inspection Procedure 71707 to conduct a general walkdown of accessible portions of the Unit 1 and 2 control room ventilation systems, the Unit 2 component cooling water system, and the Unit 1 low pressure safety injection systems. In all cases, equipment operability, material condition, and housekeeping were acceptable. Applicable valves and breakers were properly aligned. Minor drawing discrepancies identified by the inspectors were forwarded to the licensee for resolution and the appropriate drawing change requests were initiated.

O2.3 Equipment Clearance Order Reviews (71707)

Several Equipment Clearance Orders were reviewed by the inspectors during the inspection period for technical and administrative adequacy. The following Equipment Clearance Orders were reviewed:

- 1-99-02-103 1A Auxiliary Feedwater Pump
- 1-99-02-077 MV-09-9 Torque Switch Inspection

- 1-99-03-054 1B Charging Pump Check Valve Replacement

- 1-99-03-035 NaOH Storage Tank Vacuum Breaker

- 2-99-04-023 Inspect/Repair 2A Emergency Core Cooling System Suction Line

- 2-99-04-040 Inspect/Repair 2B Emergency Core Cooling System Suction Line

The inspectors found that the Equipment Clearance Orders reviewed were technically adequate and the administrative details were performed in accordance with applicable procedures.

O3 Operations Procedures and Documentation

O3.1 Containment Isolation Valve Procedural and Updated Final Safety Analysis Report Discrepancies (71707)

An inspector walkdown was performed last inspection report period of the Unit 2 containment isolation valve lineup per the Updated Final Safety Analysis Report (UFSAR), Table 6.2-53, and Operating Procedure 2-0010125A, Data Sheet 45, Unit 2 Weekly Safety System Walkdown (see Section O2.4 of IR 50-335,389/99-01). Data Sheet 45 was developed in April 1998 as an operator aid to provide a weekly check of safety related equipment status and was generated from existing system configuration and procedures. Operators used the data sheet to perform a visual check of equipment status and to identify potential discrepancies for correction. The inspector verified that actual valve position was consistent with Data Sheet 45. However, several discrepancies were identified between the observed valve position per Data Sheet 45 and the UFSAR configuration. Six containment isolation valves were found in a position different than as described in the UFSAR. The inspector notified Operations of these discrepancies and Condition Report 99-0022 was initiated. Similar discrepancies were later identified by the licensee on Unit 1. To address the immediate operability concerns, an engineering evaluation was completed which concluded that all containment isolation valve safety functions were being satisfied. Each containment isolation valve was also verified to receive an automatic containment isolation signal and was designed to fail closed.

Part 50.59 of Title 10 to the Code of Federal Regulations, Changes, Tests, and Experiments, allows the licensed facility to make changes in the facility or procedures as described in the Safety Analysis Report, without prior Commission approval, unless the proposed change involves an unreviewed safety question. Additionally, it requires the licensee to maintain records of changes in the facility or changes in procedures, to the extent that these changes constitute changes in the facility or changes in procedures as described in the Safety Analysis Report. These records must include a written safety evaluation, which provides the bases for the determination that the changes do not involve an unreviewed safety question.

According to Table 6.2-53 in the UFSAR, Pressurizer Steam Space Sample Valves, V5202 and V5205; Reactor Cavity Sump Pump Discharge Valves, LCV-07-11A and LCV-07-11B; and Primary Makeup Water Valve, HCV-15-1; were maintained in the closed position; and the Nitrogen Supply to Safety Injection Tanks Valve, V6741, was maintained in the open position.

Contrary to the above, prior to January 5, 1999, the positions of these containment isolation valves were changed from those described in the UFSAR without a written safety evaluation report to provide the bases for the determination that these changes did not involve an unreviewed safety question. A subsequent engineering evaluation concluded that all containment isolation valve safety functions were operable and no unreviewed safety questions were identified. This Severity Level IV violation is being treated as a Non-Cited Violation (NCV), consistent with Appendix C of the Enforcement Policy, and is identified as NCV 50-335,389/99-02-01, Failure to Include a Written Safety Evaluation to Provide the Bases for Changes of the Containment Isolation Valve Positions. This violation has been entered into the licensee's corrective action program as Condition Report 99-0022.

The inspector confirmed that the licensee's UFSAR update project was in progress and would have provided a specific opportunity to identify these discrepancies later this year. Containment isolation will be addressed as part of the containment vessel accuracy and completeness review, which is scheduled for completion in December 1999.

O3.2 Emergency Operating Procedure Review (40500 and 71707)

During a routine review of condition reports, the inspectors noticed that the licensee had identified several problems with the current emergency operating procedures. The inspector evaluated each condition report and concluded there were no immediate concerns that would inhibit the licensee from placing a unit in a safe condition. Interviews with the Emergency Operating Procedures Group indicated that the licensee was actively performing a review of these procedures, along with the latest revision of the Combustion Engineering Emergency Procedure Guidelines, to determine any weaknesses and discrepancies. As part of this effort, an on-shift Assistant Nuclear Plant Supervisor was temporarily assigned to the procedures group for the express purpose of searching out deficiencies which were not readily apparent. This procedure review appeared to be effectively identifying weaknesses in the existing procedures.

O4 Operator Knowledge and Performance

O4.1 Unit 1 Turbine Operator Tour (71707)

On April 9, the inspector accompanied a Unit 1 Turbine Operator on a plant tour. The operator was knowledgeable of system and component operation and any outstanding deficiencies associated with equipment. Deficiencies identified during the tour were documented by the operator and communicated to the control room. Maintenance personnel performing work activities in the Turbine Building were questioned by the operator to understand the scope of the work being performed, and to advise the

workers of any necessary precautions. Overall, the operator conducted a thorough tour using a variety of techniques to assess equipment operability and potential equipment problems.

O7 Quality Assurance In Operations

O7.1 Plant Evaluation By The Institute of Nuclear Power Operations

The Institute of Nuclear Power Operations conducted a comprehensive evaluation of the Saint Lucie Nuclear Power Plant during the weeks of February 22 and March 1, 1999. An inspector reviewed the Interim Report dated April 6, 1999, and concluded that the report did not contain any safety issues requiring immediate NRC attention. The inspectors were familiar with the nature and context of the significant issues addressed in the report. The findings did not warrant reassessment of current NRC perspectives regarding licensee performance.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Maintenance Work Order and Surveillance Observations

a. Inspection Scope (61726 and 62707)

The resident inspectors observed all or portions of the following maintenance and surveillance activities, including work orders (WO), Operating Procedures (OP), and Operations Support Procedures (OSP):

- OP 1-0700050 — Unit 1 Auxiliary Feed Pump Periodic Test
- WO 98001634 — 72 Month Motor Overhaul for HVS-4A
- WO 98028771 — Unit 1 Feedwater Control Valve Repair
- 1-OSP-22.05 — Unit 1 Quarterly Turbine Trip Test
- WO 99004416 — Unit 2 Engineered Safeguard System Relay Testing
- WO 99004251 — Unit 2 B Qualified Safety Parameter Display System Repair and Troubleshooting
- WO 99004428 — Unit 1 Quarterly Linear Power Range Nuclear Instrument Preventive Maintenance
- WO 98017898 — Unit 1 Valve MV-14-4 Operator Preventive Maintenance

b. Observations, Findings, and Conclusions

Work was performed consistent with the established work control processes. Maintenance supervision and Engineering were closely involved in the work activities. The tasks were competently performed by knowledgeable workers actively using the work packages and procedures. The inspectors observed that work activities were properly documented. Additionally, problems encountered during the performance of the work activities were appropriately resolved and/or condition reports were written.

Specific discussions of additional maintenance and surveillance observations are presented in Sections M1.2 and M1.3 below.

M1.2 Unit 2 Emergency Core Cooling System Leak Repairs

a. Inspection Scope (62707)

The inspectors observed planning and maintenance activities associated with the emergency core cooling system leak repairs that occurred during the inspection period.

b. Observations and Findings

Portions of the Unit 1 and 2 emergency core cooling system suction header piping have been experiencing chloride stress corrosion cracking which has resulted in small through-wall leaks. The corrosion has been attributed to the saltwater laden atmosphere around the piping in an enclosed tunnel between the refueling water storage tank and the auxiliary building. Inspections and analyses were completed in November 1998 (during the last Unit 2 outage) to determine the extent of the chloride stress corrosion cracking problems exhibited on the Unit 2 emergency core cooling system piping. As a result of the indications of corrosion problems on Unit 2, monthly inspections and pipe washdowns of both units were implemented to detect and mitigate any further pipe degradation. Additional indications of leaks were found during the Unit 2 inspections conducted in March and April 1999. In March, only the 2A header was affected. But during the April inspection, leaks were identified on both suction headers, which resulted in the actions described in Section O1.2. To date, Unit 1 has not exhibited leaks similar to Unit 2, apparently because the affected welds on Unit 1 were coated a couple of years ago.

Although the operability determination (Section O1.2, of the report) per PSL-ENG-SEMS-98-102, Revision 2, Engineering Evaluation of Emergency Core Cooling System Suction Lines, concluded the piping was operable, a decision was made to perform code repairs on the Unit 2 emergency core cooling system suction piping. NRC review of the evaluation did not identify any significant deficiencies. Repairs were made, one header at a time, within the 72-hour Technical Specification 3.5.2 Action Statement periods. The repairs required draining portions of the suction piping.

Maintenance was first performed on the 2A header since it appeared to be the simpler of the two headers to repair. Health Physics support provided contamination controls for the welding crew as flaw excavation progressed. Housekeeping associated with the job site was good, meeting the requirements of the Conduct of Maintenance procedure. A review of the work package was performed by the inspector and the package was determined to be administratively accurate. Additionally, the inspector verified, equipment was staged to implement the licensee's contingency actions for installing soft patches over pipe holes should the system be required during repairs.

Planning activities associated with the 2B header maintenance were more complicated than the 2A header since additional repairs were required involving several flaw sizes and the flaw locations were not yet fully characterized. The responsible licensee organizations developed a schedule with sufficient contingencies in place to provide quick resolutions to potential problems encountered during the repair process. This helped minimize equipment outage time. The inspector accompanied the operators as the equipment clearance was implemented and pipe draining commenced. Operators performing this task were well prepared and received a comprehensive brief for completing this potentially lengthy job in an efficient manner. Observations of the work in progress were made as weld and quality control crews conducted flaw excavations and liquid penetrant examinations. These activities were accomplished according to applicable maintenance and non-destructive examination procedure requirements. Effective teamwork was witnessed as multiple maintenance crews were utilized to work simultaneously at each excavation point to further reduce emergency core cooling system header out of service time. Lessons learned from the 2A header repairs were effectively implemented during the planning and repair stages of the 2B header maintenance to complete the job successfully and on schedule.

c. Conclusions

Application of lessons learned and effective teamwork during the planning, preparation, and implementation of work, resulted in successful repairs of emergency core cooling system header leaks while minimizing the out of service time of important safety systems.

M1.3 Unit 1 Sodium Hydroxide (NaOH) Tank Vacuum Breaker Check Valve Surveillance

a. Inspection Scope (61726)

On March 9, an inspector observed the performance of Step 3.0, Flow Exercising of NaOH Tank Vacuum Relief Check Valves, of Data Sheet 24 in OP-1-0010125A, Valve Testing Procedure. The inspector also reviewed applicable condition reports, discussed the condition reports with responsible engineering personnel, and walked down the NaOH tank to verify compensatory actions were in place.

b. Observations and Findings

A test engineer conducted this routine surveillance test in a step-by-step manner per the procedure. However, during the surveillance testing, the engineer mentioned that the acceptance criteria required by Data Sheet 24 may be insufficient. When questioned further by the inspector, the engineer explained that a review had recently indicated that the acceptance criteria may not be appropriate. He had identified the condition during a recent inservice test program review, in which he determined the original acceptance criteria was inadvertently based on shared air flow between the two vacuum breaker check valves. A more appropriate acceptance criteria should have been based on the full air flow expected during operation of both containment spray pumps with only one operable vacuum breaker check valve. This full air flow was expected to be twice as

much as the 74 liters per minute required by Data Sheet 24. Plant Manager Action Item (PMAI) 99-01-195 had been written to address a number of potential issues involving inservice testing of check valves.

At the time of the surveillance test, the NRC inspector questioned if the potential effects of the incorrect acceptance criteria on past surveillance tests and operability and reportability implications had been considered. After additional discussion, the licensee concluded that the significance of the engineer's finding should have been recognized and Condition Report 99-0359 was initiated on this issue. Although PMAI 99-01-0195 addressed the overall testing issue, a condition report had not yet been initiated on this specific vacuum breaker check valve issue since it had not yet been fully evaluated by engineering.

During actual testing, the first vacuum relief check valve (V07231) opened properly and met the required acceptance criteria of Data Sheet 24. The valve also met the engineer's expectation for full flow (see above). However, the second valve (V07232) failed to open at all. The engineer promptly notified the control room and initiated a three day condition report, Condition Report 99-0315, a few hours later. This was the third vacuum breaker check valve failure in the past year. Both V07231 (Condition Report 98-0161) and V07232 (Condition Report 98-2069) had failed to open during previous surveillance testing in 1998.

Similar to past events, interim operability of the NaOH tank was assured by tagging open the vent valve (V07233). The inspector verified V07233 was tagged open and appropriate protection for foreign material exclusion was in place. Vent path capability was validated by engineering, as part of the interim disposition documented in Condition Report 99-0315. The condition report also referenced a previous safety evaluation that concluded this configuration did not constitute an unreviewed safety question.

Subsequent disassembly of V07232 confirmed the failure mechanism was the same as prior failures. The valve plug was stuck closed due to the deposition of NaOH crystals on internal valve guide surfaces from precipitation. Following the two failures in 1998, both check valves had been modified (i.e., reoriented) to allow internal surfaces to drain. The inspector had observed the recent modification of V07232. However, this modification apparently did not correct the problem. As part of Condition Report 99-0315, the licensee was investigating other potential long-term fixes.

The final engineering disposition for the combined Condition Reports 99-0315/0359 was thorough and comprehensive. System operability was reconfirmed. The licensee determined that their failure to adequately test the vacuum breaker check valves using correct acceptance criteria constituted a reportable event (see LER 50-335/99-01). In the LER, the licensee stated that Engineering could have recognized the significance of the potential inadequate vaccuum breaker testing in a more timely manner. Additional NRC inspection will be conducted during the LER closeout review.

c. Conclusions

Surveillance testing of the Unit 1 NaOH tank vacuum breaker check valves was conducted in a methodical, step-by-step manner. The test engineer immediately notified the control room and wrote a three-day condition report when one of the check valves failed to open. Compensatory measures to restore operability were prompt and effective. Engineering dispositions of the applicable condition reports were thorough and comprehensive.

M8 Miscellaneous Maintenance Issues

M8.1 (Closed) LER 50-389/98-008-00: Missed Technical Specification (TS) Steam Generator U-Tube Inspection. (92902)

On November 18, 1998, during the SL2-11 refueling outage, the licensee determined that three steam generator U-tubes had not received TS required surveillance inspections during the previous refueling outage. The condition was identified during steam generator eddy current test examinations using improved data analysis and data management processes put in place for the SL2-11 refueling outage. Subsequent eddy current inspections revealed that these tubes remained operable during the missed surveillance time period. The cause of the missed eddy current test surveillances was encoding errors that emerged while using remote positioning equipment. The failure to complete the required tube inspections constituted a violation of Technical Specification 4.4.5.2.b.1 and Table 4.4-2. This Severity Level IV violation is being treated as a Non-Cited Violation, consistent with Appendix C of the NRC Enforcement Policy, and will be identified as NCV 50-389/99-02-02, Missed Steam Generator U-Tube Inspection. This violation occurred during the Unit 2 cycle 10 refueling outage and is in the licensee's corrective action program as Plant Manager Action Item PMAI-98-11-164. The LER is closed.

III. Engineering

E2 Engineering Support of Facilities and Equipment

E2.1 Engineering Root Cause Team Performance

a. Inspection Scope (37551)

The inspector observed the performance of an Engineering Root Cause Team that was assembled to coordinate troubleshooting and repair activities associated with the 2B qualified safety parameter display system (QSPDS). The QSPDS provides control room indication of core exit thermocouples, reactor coolant sub-cooling margin, and reactor vessel level.

b. Observations and Findings

Over a period of two weeks in March, the 2B QSPDS failed several times. Successful attempts were made to repair the different symptoms, however the system continued to exhibit poor reliability. A Root Cause Team was assembled consisting of system experts to evaluate indications and formulate troubleshooting plans. Unit 2 entered a seven day Technical Specification Action Statement on March 21, to determine the cause of the failures and repair the QSPDS. Early in the process, the inspector noted that the Root Cause Team lacked Operations support which could have provided valuable input regarding past system problems and indications, and various Technical Specification interpretations.

Initially, troubleshooting progressed with little success since the nature of the instrumentation problem was very difficult to isolate. However, good teamwork by all members of the Root Cause Team was observed as continued attempts were made to establish the root cause of the multiple system failures. Additionally, efficient root cause evaluation techniques were utilized to give direction to the team as continued attempts were made to isolate the problem. An outside vendor was requested and provided the assistance needed to successfully identify and correct the cause of the system malfunction. Communications were good between Engineering and Maintenance personnel involved in the troubleshooting efforts. The inspector observed that the status of the troubleshooting was not routinely reported to the Operations crews.

c. Conclusions

The Root Cause Team assembled to coordinate troubleshooting and repair activities for the 2B Qualified Safety Parameter Display System used good teamwork to systematically determine the root cause of the equipment failure. Communications were effective between team members.

E8 Miscellaneous Engineering Issues

E8.1 (Closed) LER 50-389/98-001, High/Low Pressure Shutdown Cooling Interface Outside Appendix R Design Bases (92700)

On February 6, 1998, Engineering personnel determined that the Unit 2 low pressure safety injection (LPSI) system did not meet Appendix R requirements for protection from fire-induced hot shorts. This condition was identified as part of the licensee's 10 CFR 50 Appendix R Fire Protection Safe Shutdown review. Significant Condition Report 98-0225 was promptly initiated to assess and correct the problem. More specifically, Engineering had identified that a postulated fire could result in a loss of coolant accident (LOCA) from a high to low pressure interface condition due to the spurious opening of SDC suction isolation valves by a single fire. Inadequate protection of the motor-operated valve (MOV) power cables for SDC suction isolation valves (i.e., V3480, V3481, V3651 and 3652) had existed since December 1995 when the normal position of the SDC suction cross-tie MOV (V3545) was changed from closed to "locked open" due to pressure locking concerns. Until then, the potential spurious opening of train "A" or

"B" SDC suction isolation MOVs from a single fire had no significant consequence because V3545 was closed and not affected by the same fire. However, during the recent design change to reposition V3545, engineers failed to recognize, that even with power removed, the SDC suction isolation valves were susceptible to fire-induced failure modes which could cause the valves to open. If both the SDC suction valves in either train "A" or "B" spuriously opened due to a fire while V3545 was open, the RCS could overpressurize the SDC system, causing an intersystem LOCA.

Once this condition was identified, the licensee implemented immediate corrective actions. These actions included compensatory measures that ensured fire watches were established in affected fire areas of the Unit 2 reactor auxiliary building (RAB). Fire breach permits were also issued specifically for each of the outside containment SDC valve (i.e., V3652 and 3480) power cables, and a memo was issued to all fire watch personnel regarding the V3652 and V3480 fire impairments. In addition, Unit 2 Operations personnel were alerted via night orders of the potential vulnerability of a high to low pressure system interface condition between the RCS and SDC systems due to a fire in specific areas. Furthermore, the licensee confirmed that Unit 1 was not affected because of distinct design differences. A licensee event report (LER) was written and submitted to the NRC in a timely manner. During this inspection and IR 98-14, inspectors reviewed the LER and verified all of the immediate corrective actions were accomplished as described above.

The root cause was attributed to personnel error in the preparation and development of the plant change/modification (PC/M) to reposition V3545. The responsible engineers did not properly evaluate the change against design basis requirements for primary system high/low pressure interfaces. A contributing factor was the lack of detail in the Unit 2 Safe Shutdown Analyses (SSA) with respect to cable failure mode assumptions and methodology. To prevent recurrence, the licensee developed a document on cable failure mode methodology for evaluating high/low pressure interfaces during the Unit 1 and 2 SSA validation effort. Also, during the first quarter of 1998, Fire Protection was the principal subject of the continuing training program for engineering support personnel. An inspector reviewed the licensee's lesson plan and verified the details of this LER were specifically included as part of the training. The inspector reviewed the availability of the cable failure methodology documents in place for use by the Engineering Department.

As a permanent corrective action, PC/M 98-031 was implemented which rerouted the power cables for V3652 and V3480 in dedicated conduits to preclude postulated cable failures from leading to an intersystem LOCA due to a fire in any fire area of the RAB. The inspectors walked down the installation of PC/M 98-031 during SL2-11, observed portions of the post-modification testing, and reviewed the completed work order packages. Based upon completion of this modification, and the actions discussed above, the inspectors concluded all the corrective actions described in the LER have been accomplished. These corrective actions were considered appropriate and comprehensive for postulated fires outside containment in the RAB.

Both the LER and significant condition report provided the licensee's assessment regarding the safety and risk significance of the identified condition. The inspectors have reviewed these assessments and concluded that the potential consequences of the postulated failure were of high significance, although there existed several mitigating factors which made the probability and potential of the condition occurring very low.

Failure to provide adequate fire protection for the Unit 2 SDC suction isolation MOV power cables constituted an apparent violation of 10 CFR 50, Appendix R, Section III.L.7. Operating License NPF-16, Condition 2.C(20), which specified that the licensee shall implement and maintain in effect all provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report (UFSAR). Section 6.0, Primary Coolant System Interfaces, of UFSAR Appendix 9.5A, Fire Protection Program Report, specifically stated in part, that "Several low pressure systems [e.g., Low Pressure Safety Injection System] are connected to the high pressure primary coolant system. In these instances, low pressure system isolation is provided by redundant electrically operated valves. The design of these systems ensures that a fire induced LOCA cannot result from a single fire opening two valves in series at a high/low pressure interface." This apparent violation is identified as EEI 50-389/99-02-03, High/Low Pressure Shutdown Cooling Interface Outside Appendix R Design Bases. The LER is considered closed.

E8.2 <u>(Closed) VIO 50-389/98-11-01, Inadequate Corrective Actions To Restore Unit 2 Containment Sumps To Design Requirements</u> (92700 and 92903)

<u>(Closed) LER 50-389/97-002-01, Containment Sump Debris Screens Not In Accordance With Design Due To Gaps In Screen Enclosure</u>

Full compliance was achieved on December 2, 1998, when modifications of the Unit 2 emergency core cooling systems (ECCS) containment sump screens to meet design requirements were completed. The licensee's immediate corrective actions and restoration of compliance were verified by the inspectors (see Section.E8.2 of IR 50-389/98-11).

On December 22, 1998, the licensee issued a revision to LER 50-389/97-002 describing the additional ECCS sump screen deficiencies identified during the eleventh Unit 2 refueling outage (SL2-11). This LER revision also described the corrective actions taken during SL2-11, which were verified by the inspectors. Furthermore, the revision provided a description of the results from the Unit 1 ECCS sump screen inspections conducted during SL1-15. An inspector reviewed the revised LER. This LER revision is considered closed.

The licensee initiated Condition Report 99-0036 to specifically track VIO 98-11-01 in the corrective action program. By letter dated February 4, 1999, the licensee responded to VIO 98-11-01 in a timely manner with a detailed discussion of the corrective actions taken, results achieved, and proposed actions to avoid recurrence. The inspector reviewed the licensee response and confirmed associated corrective actions from Condition Report 99-0036 were entered into the plant manager action item tracking

system. In addition to verifying the actions taken to achieve compliance, the inspector also verified selected corrective actions intended to avoid recurrence of the violation were completed. This violation is considered closed.

IV. Plant Support

R4 Staff Knowledge and Performance in Radiation Protection and Chemistry

R4.1 Health Physics Routine Surveys (71750)

The inspector observed Health Physics technicians perform daily and weekly routine radiation and contamination surveys of the reactor auxiliary building. Technicians adequately performed required checks of the instruments used. Additionally, they were knowledgeable of the instruments and the detection methods involved. Thorough surveillance techniques were observed. Conservative detection methods were used by the technicians in dose rate measurements to provide worst case radiation levels for maps of the general areas of the reactor auxiliary building. Routine surveys observed by the inspector were completed by knowledgeable technicians using efficient and conservative methods.

P1 Conduct of EP Activities

P1.1 Annual Emergency Plan Exercise And Call-Out Drill (71750)

On March 11, the inspectors participated in the annual Emergency Plan exercise, which included offsite participation by state and local officials. The inspectors participated as NRC personnel in the simulator control room and Technical Support Center (TSC). All emergency response facilities (ERFs) were observed or reported to be fully manned in a timely manner. The exercise scenario was well crafted, and challenged the emergency response organization (ERO). In general, communications within the TSC, and coordination between the TSC and other ERFs, was effective. Licensee declarations of progressively higher emergency action level classifications were consistent with EP implementing procedures and the simulated deterioration of plant conditions. Several performance issues were discussed during the post-exercise critique and documented by condition reports as lessons learned to improve future performance.

On March 24, the licensee conducted an unannounced drill of their emergency call-out system. The NRC inspectors received notification of the drill as part of the call-out. Subsequent discussions with the emergency preparedness supervisor on the following day confirmed this call-out was successful. More than enough personnel replied to meet all ERO staffing requirements. Additionally, an inspector met with the HP Supervisor to specifically verify current availability of qualified HP technicians to meet ERO requirements in light of the support sent to Turkey Point for their ongoing refueling outage. The existing HP manning was verified to meet ERO staffing requirements.

V. Management Meetings and Other Areas

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on April 20, 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. Allen, Operations Manager
C. Bible, Site Engineering Manager
G. Bird, Security Manager
W. Bladow, Site Quality Manager
D. Fadden, Training Manager
J. Holt, Maintenance Manager
H. Jacobs, Mechanical Maintenance Supervisor
E. Katzman, Supervisor, Health Physics & Chemistry
C. Ladd, Operations Supervisor
R. McCullers, Supervisor, Health Physics
K. Mohindroo, Plant Engineering Manager
M. Moran, Operations Support Engineer Manager
T. Patterson, System Engineering Manager
A. Scales, Assistant Operations Supervisor
A. Stall, St. Lucie Plant Vice President
E. Weinkam, Licensing Manager
C. Wood, Work Control Manager
R. West, St. Lucie Plant General Manager

INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 40500:	Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems
IP 61726:	Surveillance Observations
IP 62707:	Maintenance Observations
IP 71707:	Plant Operations
IP 71750:	Plant Support Activities
IP 92700:	Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities
IP 92902:	Followup - Maintenance
IP 92903:	Followup - Engineering

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-335, 389/99-02-01	NCV	Failure to Include a Written Safety Evaluation to Provide the Bases for Changes of the Containment Isolation Valve Positions. (Section O3.1)
50-389/99-02-02	NCV	Missed Steam Generator U-Tube Inspection (Section M8.1)
50-389/99-02-03	EEI	High/Low Pressure Shutdown Cooling Interface Outside Appendix R Design Bases (Section E8.1)

Closed

50-335, 389/99-02-01	NCV	Failure to Include a Written Safety Evaluation to Provide the Bases for Changes of the Containment Isolation Valve Positions. (Section O3.1)
50-389/99-02-02	NCV	Missed Steam Generator U-Tube Inspection (Section M8.1)
50-389/98-11-01	VIO	Inadequate Corrective Actions To Restore Unit 2 Containment Sumps To Design Requirements (Section E8.2)
50-389/97-002-01	LER	Containment Sump Debris Screens Not In Accordance With Design Due To Gaps In Screen Enclosure (Section E8.2)
50-389/98-001-00	LER	High/Low Pressure Shutdown Cooling Interface Outside Appendix R Design Bases (Section E8.1)
50-389/98-008-00	LER	Missed Technical Specification Steam Generator U-Tube Inspection (Section M8.1)