UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

Report Nos.: 50-335/94-25 and 50-389/94-25

Licensee: Florida Power & Light Co
9250 West Flagler Street
Miami, FL 33102

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

Facility Name: St. Lucie 1 and 2

Inspection Conducted: December 4 - 31, 1994

Inspectors: _____ 1/19/95
R. L. Prevatte, Senior Resident Inspector — Date Signed

_____ 1/19/95
M. S. Miller, Resident Inspector — Date Signed

_____ 1/19/95
R. P. Schin, Project Engineer — Date Signed

Approved by: _____ 1/19/95
K. D. Landis, Chief — Date Signed
Reactor Projects Section 2B
Division of Reactor Projects

## SUMMARY

Scope: This routine resident inspection was conducted onsite in the areas of plant operations, maintenance and surveillance, engineering support, plant support, and other areas.

Inspections were performed during normal and backshift hours and on weekends and holidays.

Results: Plant operations area:

Operations continued to be conducted in a safe manner. One example of operator inattentiveness to detail in control board walkdowns was identified, as was an isolated example of poor housekeeping. Primary and secondary system walkdowns conducted following the Unit 1 restart resulted in the identification of several leaks and other minor material condition items which were promptly corrected.

Maintenance and Surveillance area:

Maintenance activities observed during this inspection period were conducted well. The inspectors found that management oversight of a number of sensitive activities was excellent and that personnel developing and executing corrective actions exhibited competence and professionalism.

Engineering area:

Engineering's analysis of the significance of, and corrective actions to, the issue of NaOH eductor cross connection to be thorough and of appropriate depth. The following non-cited violations were identified associated with an event reported by the licensee:

NCV 335/94-25-01, Inadequate Design Control, paragraph 5.a.

Plant Support area:

Plant support activities continued to be conducted well. Fire brigade performance during a drill involving off-site support from the county was considered excellent.

## REPORT DETAILS

1. Persons Contacted

Licensee Employees

R. Ball, Mechanical Maintenance Supervisor
W. Bladow, Site Quality Manager
L. Bossinger, Electrical Maintenance Supervisor
* H. Buchanan, Health Physics Supervisor
C. Burton, St. Lucie Plant General Manager
R. Church, Independent Safety Engineering Group Chairman
* R. Dawson, Licensing Manager
D. Denver, Site Engineering Manager
J. Dyer, Maintenance Quality Control Supervisor
H. Fagley, Construction Services Manager
P. Fincher, Training Manager
R. Frechette, Chemistry Supervisor
K. Heffelfinger, Protection Services Supervisor
J. Holt, Plant Licensing Engineer
* G. Madden, Plant Licensing Engineer
* J. Marchese, Maintenance Manager
W. Parks, Reactor Engineering Supervisor
C. Pell, Outage Manager
L. Rogers, Instrument and Control Maintenance Supervisor
D. Sager, St. Lucie Plant Vice President
* J. Scarola, Operations Manager
D. West, Technical Manager
J. West, Site Services Manager
C. Wood, Operations Supervisor
W. White, Security Supervisor

Other licensee employees contacted included engineers, technicians, operators, mechanics, security force members, and office personnel.

NRC Personnel

R. Prevatte, Senior Resident Inspector
* M. Miller, Resident Inspector
R. Schin, Project Engineer

* Attended exit interview

Acronyms and initialisms used throughout this report are listed in the last paragraph.

2. Plant Status and Activities

a. Unit 1

Unit 1 began the inspection period at 100 percent power and operated at essentially full power throughout the period.

b. Unit 2

Unit 2 began the inspection period at 100 percent power and operated at full power with the exception of a one week period in which power was reduced for condenser waterbox cleaning.

c. NRC Activity

Mr. Robert Schin, Project Engineer from NRC Region II, visited the site from December 5 to December 9 to assist in the resident inspection effort. His inspection activities are contained in this report.

3. Plant Operations

a. Plant Tours (71707)

The inspectors periodically conducted plant tours to verify that monitoring equipment was recording as required, equipment was properly tagged, operations personnel were aware of plant conditions, and plant housekeeping efforts were adequate. The inspectors also determined that appropriate radiation controls were properly established, critical clean areas were being controlled in accordance with procedures, excess equipment or material was stored properly, and combustible materials and debris were disposed of expeditiously. During tours, the inspectors looked for the existence of unusual fluid leaks, piping vibrations, pipe hanger and seismic restraint settings, various valve and breaker positions, equipment caution and danger tags, component positions, adequacy of fire fighting equipment, and instrument calibration dates. Some tours were conducted on backshifts. The frequency of plant tours and control room visits by site management was noted.

The inspectors routinely conducted main flow path walkdowns of ESF, ECCS, and support systems. Valve, breaker, and switch lineups as well as equipment conditions were randomly verified both locally and in the control room. The following accessible-area ESF system and area walkdowns were made to verify that system lineups were in accordance with licensee requirements for operability and equipment material conditions were satisfactory:

- Unit 2 Spent Fuel Pool Cooling and Purification Systems
- 2A and 2B Auxiliary Feed Pumps and Condensate Storage Tank
- 1A/1B Diesel Fuel Oil Transfer Systems
- 2A/2B Boric Acid Makeup Systems

No violations or deviations were identified; however, a housekeeping issue was identified in the Spent Fuel Pool Cooling area and is described in paragraph 3.c, below.

b. Plant Operations Review (71707)

The inspectors periodically reviewed shift logs and operations records, including data sheets, instrument traces, and records of equipment malfunctions. This review included control room logs and auxiliary logs, operating orders, standing orders, jumper logs, and equipment tagout records. The inspectors routinely observed operator alertness and demeanor during plant tours. They observed and evaluated control room staffing, control room access, and operator performance during routine operations. The inspectors conducted random off-hours inspections to ensure that operations and security performance remained at acceptable levels. Shift turnovers were observed to verify that they were conducted in accordance with approved licensee procedures. Control room annunciator status was verified. Except as noted below, no deficiencies were observed.

During a Unit 1 control room tour on December 13, the inspector noted that the LPSI header pressure meter, PI-3307, indicated approximately 160 psig without LPSI pumps operating. In such a condition, the meter should have indicated RWT static head (approximately 20 psig). The inspector notified the ANPS. An inspection of the strip chart recorder associated with the subject instrument loop revealed that the loop had indicated the same pressure for as far back as December 2, when the strip chart paper roll was installed.

The ANPS directed a SNPO to carefully crack open a drain valve on the header in an attempt to determine whether the indication was the result of pressure trapped between check and isolation valves. The SNPO reported that, while water issued from the drain line, it was not under high pressure and was more indicative of RWT head than of trapped pressure. Control room personnel noted that the evolution did not result in a change in indicated header pressure. The ANPS then directed that the SNPO verify that the root and isolation valves for the loop's pressure transmitter were open. The valves were found to be open. PWO 94018928 was initiated to troubleshoot the transmitter. The transmitter was found to be "flat lining" and was replaced.

The inspector discussed the purpose of the meter with control room personnel and found that it was primarily used for information and that no EOP-based critical decisions were based upon its output. On the same portion of the control panel in question, LPSI flow was indicated; thus, a backup parameter was available to operators which described LPSI system performance.

The inspector found the ANPS's actions in response to the noted indications to be methodical and thorough. However, the failure of control room operators to note the errant indication, which had existed for at least two weeks, was considered a weakness in control room operator attentiveness to detail during control board walkdowns.

The posting of required notices to workers was reviewed.

No violations or deviations were identified.

c. Plant Housekeeping (71707)

Storage of material and components, and cleanliness conditions of various areas throughout the facility were observed to determine whether safety and/or fire hazards existed. Areas were in generally good condition. The inspector noted several examples of poor housekeeping in the Unit 2 spent fuel pool cooling areas, consisting of gloves and shoe covers loose in the floor and in pipe chases below grade. The inspector notified the Unit 2 HP Supervisor, who assigned personnel to address the situation. The condition was corrected the same day.

No violations or deviations were identified.

d. Clearances (71707)

During this inspection period, the inspector performed a walkdown of clearance 1-94-12-091 on closed blowdown cooling pumps 1A and 1-94-12-084 on 1B battery charger. The clearance tags were in place and the breakers were in the correct position as stated on the clearance tag.

e. Technical Specification Compliance (71707)

Licensee compliance with selected TS LCOs was verified. This included the review of selected surveillance test results. These verifications were accomplished by direct observation of monitoring instrumentation, valve positions, and switch positions, and by review of completed logs and records. Instrumentation and recorder traces were observed for abnormalities. The licensee's compliance with LCO action statements was reviewed on selected occurrences as they happened. The inspectors verified that related plant procedures in use were adequate, complete, and included the most recent revisions.

f. Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems (40500)

1) Facility Review Group Meetings

The inspector attended the FRG meeting on December 15 and verified that a quorum was present. The items reviewed included jumper/lifted lead 1-94-050 to eliminate a nuisance alarm, several other procedure changes, and the response to violation 94-22-01 and 02. The violation response review was very detailed and time consuming and FRG appeared to be developing a response instead of reviewing and approving a prepared response. Even though they were accomplishing details

that should have been prepared and submitted by plant staff they appeared to achieve satisfactory end results.

2) QA Audit Review

The inspector reviewed QA Audit Report QSL-OPS-94-21, "St. Lucie Plant Chemistry Functional Area Audit," which was conducted from August through October. The audit included evaluations of the licensee's primary and secondary chemistry controls, the Chemistry Department's computer software quality assurance program, the adequacy of the department's organization and programs as they related to 10 CFR 50 Appendix B, the department's awareness of industry operating events in the chemistry area, and the department's self-assessment capabilities.

The audit found no deficiencies in the licensee's program. The department's computer software QA program was noted as a strength and there were no negative findings. The inspector found the audit to be thorough and well-documented. Additionally, the inspector found that the sampling sizes of the activities monitored (e.g. 7 primary sample analyses were observed) were appropriate to determine overall department performance.

g. Outage Activities (71707)

Plant Restart

When Unit 1 was placed on line following the recent refueling outage and after all systems were placed in operation, the inspector performed a walkdown to identify system and component leaks and/or equipment performance problems. The following secondary plant items were identified:

- V8325 leaking steam on MSR 1C
- Entry permit still hanging on MSR 1C
- LG11-29 valve flange leak on MSR 1B
- V11460 valve leak on MSR 1B
- Insulation off 1A/1B alternate drains to main condenser
- Chain fall attached to line on 2nd elevation on north end of condenser
- V11629 leaking on 4B FW heater
- MSL Safety/Relief valve leaking
- V11287 leaking on 4A FW heater
- Safety chain needed at platform at north end of condenser, ground level

The above items were identified to the Unit 1 ANPS who wrote PWOs 94018600, 94018603, and 93016220 to have them corrected.

In the Unit 1 RAB, the inspector found that the number and magnitude of primary system leaks were not excessive and that all had already been identified by the licensee and contained with a catch container. The inspector did follow up on some observed conditions:

- In the hallway by fire door RA 311 (outside the CEA MG set room) was a poly hose coming down from above safety-related electrical cable trays and going to a floor drain. The hose had contamination control tag # 1-1029 and PWO tag # 65686 attached, with the following information: pipe elbow leak - leaking weld. The inspector asked the licensee if they had assured that the leaking weld would withstand a seismic event. A licensee maintenance engineer found that the leak was not from a cracked weld, but was from a potable water threaded pipe connection above the cable trays. The inspector also looked in the overhead above the cable trays and verified that the leak was from a threaded fitting and was very minor. The inspector had no further safety concern with regard to this leak.

- On the lower level main hallway wall, among the BAM pump discharge valves, was a poly hose that had become disconnected from its catch container and fallen between pipes about three feet below the catch container. The inspector observed no active leaking. However, the poly hose contained about one-half quart of water that could spill onto the floor if the open hose end fell any lower. The inspector informed health physics personnel, who promptly corrected the condition.

- The inspector observed about 15 drain hoses in various RAB rooms that were connected downstream of one-inch vent and drain valves of safety-related systems, with no PWO tags and no apparent valve leakage. The hoses were apparently left from operational use. The unit ANPS stated that operators did not plan to leave those hoses connected permanently, but planned to remove them soon. The next morning, the inspector noted that a new PWO had been written for maintenance personnel to remove the hoses. A maintenance engineer stated that the removal of hoses used for operational purposes (not maintenance) had previously been done by maintenance personnel, but had recently been turned over to operators. The inspector considered this as a matter of housekeeping, and plans to follow up on the removal of these hoses.

In conclusion, operations continued to be conducted in a safe manner this inspection period. One example of operator inattentiveness to detail in control board walkdowns was identified, as was an isolated example of poor housekeeping. Primary and secondary system walkdowns conducted following the Unit 1 restart resulted in the identification of several leaks and other minor material condition items which were promptly corrected.

4. Maintenance and Surveillance

a. Maintenance Observations (62703)

Station maintenance activities involving selected safety-related systems and components were observed/reviewed to ascertain that they were conducted in accordance with requirements. The following items were considered during this review: LCOs were met; activities were accomplished using approved procedures; functional tests and/or calibrations were performed prior to returning components or systems to service; quality control records were maintained; activities were accomplished by qualified personnel; parts and materials used were properly certified; and radiological controls were implemented as required. Work requests were reviewed to determine the status of outstanding jobs and to ensure that priority was assigned to safety-related equipment. Portions of the following maintenance activities were observed:

1) PWO 63-2939 - Unit 1 Governor Valve 1 Shows 40 Percent Open When Fully Open.

This PWO was written to investigate and repair the above problem. The I&C department, after initial troubleshooting, believed the problem was the LVDT that provides valve position to the GV control system.

Work on this system with the unit at 100 percent power provided a high risk for turbine trip and possible malfunction of the governor valve. The licensee reviewed this work in the FRG and developed a letter of instruction 1-LOI-0-68 to provide guidance for operator actions in the event GV-1 should close while the maintenance activity was being performed. I&C also developed a detailed, step-by-step, procedure for troubleshooting and repair activities. Troubleshooting the circuitry required installing a temporary power supply to maintain GV-1 open and lifting leads to troubleshoot the circuit.

A prejob briefing in accordance with AP-0010020, "Conduct of Infrequently Performed Tests and Evolutions," was held prior to starting work. The inspector attended this briefing and found it to be very detailed, covering all procedural requirements for the work. At the end of the briefing the operations supervisor questioned each operator on what action they would take if a malfunction occurred.

The inspector observed the installation of the temporary power supply and the lifting of leads and verified that these tasks were accomplished in accordance with procedures. After about one hour of troubleshooting, the problem was identified as several broken strands of wire that resulted in a high resistance connection. This connection was relugged and

reterminated. All other connections in this area were verified tight or tightened as needed. All lifted leads were restored, the temporary power supply removed, and GV-1 was returned to service.

The inspector observed all of the above activities and noted that the activity was well-planned and personnel were prepared to complete the activity and address contingencies if they occurred. Operations and Maintenance management and supervisory involvement and oversite was evident in the planning and job execution. The technicians appeared to be skilled and performed the activity as planned and without incident.

2) Competing Critical Maintenance Items

On December 9, the licensee encountered three significant Unit 1 maintenance challenges: the apparent failure of an ESF actuation subsystem power supply, an indication of a failed Unit 1 4160V undervoltage relay, and the troubleshooting/repair of Unit 1 RPS channel D. Each problem presented potentially significant implications. A failure of the noted ESF power supply's redundant power supply would result in containment isolations, an MSIS, and an A side SIAS (concerns for the state of the redundant power supply were raised when it was noted that the redundant supply's output had been slowly dropping with time - although it was unclear how the single power supply should react carrying the entire load for the A side actuation relays). The failure of a second 4160 V undervoltage relay, or errors in addressing the apparently failed undervoltage relay, would lead to load shedding and an EDG start and load sequence on the effected 1E train. Maintenance errors in troubleshooting the D RPS channel could have resulted in a reactor trip.

The licensee's approach to the competing problems involved stopping all work on any two of the issues while the third was being worked, and significant management oversight of all work planned. The inspector attended a coordination meeting, conducted on December 9, in which site management and staff discussed the three competing issues and the precautions and activities which would have to be addressed. Notable during the meeting was the clear delineation of expectations on the part of the Plant General Manager to all involved parties. Engineers were directed to obtain an independent technical review of any plans developed prior to attempting to implement them. The licensee's disposition of the three issues is described below.

a) PWO 63-2921, ESF Power Supply Replacement

The inspector observed portions of the licensee's activities relating to a failure of the 24S2 power supply. The power supply in question was one of two auctioneered 24VDC power supplies which powered the A ESF actuation relays. The power supply failure had been identified on December 8 as a reduction in 24S2 power supply output voltage from a nominal 24 VDC to 5 VDC.

The licensee's activities with respect to the ESF power supply failure included: verifications that the power supply was, in fact, degraded (as opposed to there being a problem in the auctioneering or other downstream circuitry), an assessment of the practicality of replacing the power supply at power, preparation of detailed replacement instructions with management review and, finally, power supply replacement.

The inspector witnessed activities designed to establish the performance of the power supply. I&C technicians lifted power supply leads and verified that output voltage was within normal range. A 470 Ω resistance load was then placed across the power supply output and an approximate 1 VDC drop was noted. Technicians later placed a decade box across the power supply and noted that, as resistance was increased to the approximate installed load on the power supply, output voltage decreased considerably to an unacceptable level, thus providing positive proof that the power supply was degraded.

Additionally, the licensee inspected the cabinet layout to assess the possibility of changing out the power supply. The inspector noted that the power supply was located in cramped quarters, with very little space between it and other energized components. The redundant power supply was located on a shelf directly below the subject power supply, complicating the question of whether the subject supply could be replaced without leading to an inadvertent ESF actuation. The licensee ultimately determined that the power supply could be replaced and developed specific instructions to that affect.

While the replacement was performed under the subject PWO, additional controls were established under AP-0010142, Rev 11, "Unit Reliability - Manipulation of Sensitive Systems," which included a form delineating specific instructions and providing a review of the instructions by an independent technical reviewer, a department head, and the NPS. The specific instructions directed that workers take precautions against dropping tools, required the use of insulated tools, required the insulating of lifted

leads, and required that a replacement power supply be available in the control room in case the redundant power supply failed. The redundant power supply would be required to reset an ESFAS actuation due to power supply failure.

The inspector witnessed the power supply replacement, which was characterized by a cautious approach by all involved. A prejob briefing was held in the Unit 1 control room prior to commencing work. The Operations and Maintenance Managers were present for the briefing and ensuing work. The inspector noted adherence to work instructions, the appropriate use of cork insulating materials between the subject power supply and adjacent equipment, and careful, competent workmanship throughout the evolution. The power supply was replaced with one which had been bench tested prior to the replacement and which had performed satisfactorily during an 8 hour burn-in period. The replacement power supply performed satisfactorily when monitored in operation.

b) Apparent Failure of Undervoltage Relay 27X-2

During surveillance testing performed on December 8, undervoltage relay 27X-2, one of 2 such relays on the 1A3 4160 bus, failed surveillance testing. Per the AS for TS LCO 3.3.2.1, a jumper was placed across the relay, resulting in a 1-out-of-1 coincidence logic for bus load shedding and EDG start on undervoltage. The licensee prepared a troubleshooting plan per AP-0010142, "Unit Reliability - Manipulation of Sensitive Systems," which received an independent technical review and approval by both a department head and the NPS. The troubleshooting methodology was developed to discern whether the indicated failure was due to an actual failure in the subject relay or whether it was the result of a failure in the installed test circuitry for the surveillance test.

The inspector reviewed the troubleshooting plan and the appropriate circuit diagrams with the engineer who directed the effort and found the plan sound. The methodology involved what was, essentially, a reperformance of the failed surveillance test with checks of installed status lights which would indicate which relay(s) were not performing properly. Visual checks of relays involved in the testing were also made to positively establish which relays were (or were not) changing state.

The inspector observed the performance of the troubleshooting and found it to be well-controlled. Thorough explanations of the methodology was provided to

operators and maintenance personnel by the maintenance engineer who developed the process. Critical steps required independent verifications of conditions both in the performance of the troubleshooting and in the return to normal conditions.

As a result of the subject testing, the licensee was able to identify a failed relay in the installed undervoltage relay test circuitry which led to the indicated failure of the 27X-2 relay. The discrepant relay was replaced, the jumper across relay 27X-2 was removed, and the original surveillance test of the 27X-2 relay was reperformed satisfactorily to establish relay operability.

c) RPS Channel D Troubleshooting

On December 4, while in power ascension from the Unit 1 outage, the licensee noted that an RCS cold leg RTD was indicating approximately 6 degrees higher than expected. The licensee meggared the subject RTD, which involved lifting leads in the RTDs input to the RPS. Meggar results were acceptable, and the licensee noted that, when the RTD leads were relanded to the RPS, the temperature indicated by the RTDs channel was normal. Noting that the normal indications had come about without corrective actions being performed, the licensee chose to re-meggar the RTD. During this second meggaring effort, the technician performing the task mistakenly meggared the RPS side of the lifted RTD leads. At the same time (and, most likely, as a result), the D RPS Variable High Power trip alarm energized and would not clear. Plant conditions did not call for the alarm and no other RPS channel alarmed.

As the source of the problem was unknown, operators declared the D RPS trip channels receiving cold leg temperature inputs (Variable High Power, Local Power Density, Thermal Margin/Low Pressure and Loss of Load channels) inoperable. The AS for TS LCO 3.3.1.1 allowed an inoperable RPS trip channel to be placed in bypass for a period of 48 hours to allow for troubleshooting and maintenance, and required that, after the 48 hour period, the trip channels be placed in a tripped condition. Placing trip channels in bypass had the effect of placing the RPS in a 3-out-of-4 trip logic for the trip channels in question. Placing trip channels in trip resulted in placing the RPS in a 1-out-of-3 trip logic for the trip channels in question. The normal RPS trip logic is 2-out-of-4 for any given trip channel.

Troubleshooting performed during the 48 hour bypass period did not yield a root cause for the Variable High Power Trip alarm, although the licensee was able to ascertain

that the problem was isolated to the D RPS channel and that the problem cleared when the D channel was switched to the test mode, which isolated the D channel NI linear safety channel from the RPS cabinet. Upon reaching the end of the TS-allowed 48 hour bypass period, operators placed the affected trip channels in trip, which involved physically disengaging trip bistable units from the RPS cabinet. As troubleshooting prospects were not promising in this configuration (due to the electrical discontinuity posed by the disengaged bistable units), the licensee prepared a request for enforcement discretion to allow for continued troubleshooting with the affected trip channels in bypass. Such action would allow the bistable units to be reinserted in the RPS cabinet, thus providing electrical continuity.

On December 7, the licensee forwarded the subject request to the NRC. In it, the licensee requested an additional 48 hour period of cumulative bypass time, to be used as necessary over a period not to exceed 14 days. The licensee reasoned that this action would result in a reduction of risk of a unit trip while troubleshooting activities were being performed. Additionally, the licensee stated that, during periods of inactivity in the troubleshooting process, the affected trip channels would be returned to their trip configurations.

In response to the licensee's request, the NRC issued a Notice of Enforcement Discretion (NOED 94-2-009) on December 9. The NOED allowed the proposed bypassing of D channel RPS trips for a cumulative period of 48 hours over a seven day period; a reduction over the requested period due to an NRC position that the troubleshooting should proceed in a priority fashion. While the formal transmittal was dated December 9, the licensee was granted the NOED verbally on December 7, with authorization to proceed on December 8.

The licensee recommenced troubleshooting efforts, with affected trip channels in bypass, on December 8. A comprehensive troubleshooting plan was developed and implemented which involved the accumulation of data for an extensive array of RPS circuitry. Operators maintained a record of cumulative bypass time in the RCO log.

On December 9, the licensee identified a loose electrical connector which, when properly landed, led to the disappearance of a number of noise signals in the cabinet's electronics and an ability to reset the VHPT bistable. The licensee surmised that the loose connector had resulted in a ground loop in RPS channel D. The ground loop was determined to be the source of observable

electrical noise in the D RPS channel. The electrical noise produced NI and Delta T power inputs to the Q power selection logic which was processed as a valid power fluctuation which prevented the resetting of the VHPT.

On December 9, the licensee concluded troubleshooting efforts, performed appropriate surveillance tests to demonstrate operability, and declared the affected channels back in service. Cumulative time troubleshooting under the NOED provisions was 11 hours and 23 minutes. The inspectors determined that the cause of the condition requiring the NOED was not, in and of itself, a violation of NRC requirements and, as a result, no enforcement action was applicable.

In conclusion, the licensee was effective in addressing the Unit 1 maintenance activities described above. Appropriate sensitivity to the potential effects on the unit from the maintenance activities was displayed. Engineers and maintenance personnel observed by the inspector during troubleshooting and corrective actions displayed professionalism and competence throughout. Management oversight and coordination of the activities was considered excellent.

b. Surveillance Observations (61726)

Various plant operations were verified to comply with selected TS requirements. Typical of these were confirmation of TS compliance for reactor coolant chemistry, RWT conditions, containment pressure, control room ventilation, and AC and DC electrical sources. The inspectors verified that testing was performed in accordance with adequate procedures, test instrumentation was calibrated, LCOs were met, removal and restoration of the affected components were accomplished properly, test results met requirements and were reviewed by personnel other than the individual directing the test, and that any deficiencies identified during the testing were properly reviewed and resolved by appropriate management personnel. The following surveillance test was observed:

OP-3200051, Rev 12, "At Power Determination of Moderator Temperature Coefficient and Power Coefficient"

The inspector witnessed the subject surveillance test, conducted on Unit 1 on December 15. The test involved a succession of turbine load changes, compensated for by CEA movement to maintain reactor power at approximately 100 percent, to affect RCS temperature changes. Temperature changes were then compared to CEA position changes to determine MTC.

The test was directed by a reactor engineer and was conducted by control room operators with both the ANPS and NPS present. As this test was an infrequently performed evolution which induced minor transients on the unit, a management briefing of personnel

performing the test was conducted prior to beginning. The inspector noted good coordination between operators before commencing the test, with discussions of necessary actions, expected unit response, and contingency actions. Several copies of the test procedure were available in the control room and were referred to frequently.

The test was executed well, characterized by good communication between operators and the reactor engineer compiling data. The ANPS was noted to limit control room access and noise-producing activities in the control room area during the test. Three cycles of data acquisition were performed and the results of the test were acceptable.

c. Followup on Previous Maintenance Findings (61726)

IR 94-24 documented two nearly simultaneous failures of Rosemount pressure transmitters employed for pressurizer pressure monitoring on Unit 1. The failure modes for the two transmitters appeared to be identical, with each transmitter slowly increasing in output and maintaining an artificially high output for some time after the failure. Post-event testing showed extremely sluggish response on the part of both transmitters. Rosemount indicated to the licensee that the circumstances of the failures did not represent known failure modes experienced in nuclear applications (e.g. oil loss, oil contamination); however, Rosemount indicated that failures of the type experienced on Unit 1 were known to have occurred in non-nuclear applications and were the result of gases trapped in the oil space of the transmitter.

During the current inspection period, the licensee disassembled the subject transmitters with a representative of Rosemount on site. The disassembly involved the removal of the pressure sensing unit from the transmitters and an inspection for oil loss. The inspector observed the process and noted that no oil loss was indicated. However, the licensee noted that the high pressure side isolators (thin stainless steel diaphragms) of the transmitters were bulged and were elastic under the force of a finger. The Rosemount representative explained that the isolators should be much more firm to the touch and should not have been bulging. The low pressure sides of both were flat and firm to the touch.

A potential source of gas which may have been entrained in the transmitters' high pressure cells was said to be hydrogen, which may have diffused through the isolators. At the end of the inspection period, the licensee was working with Rosemount to develop a process to remove the contents of the transmitters' cells and to perform gas chromatography on any gases found in an attempt to identify their source. While Rosemount had the necessary equipment to perform the task, the transmitters were contaminated as a result of their service applications and the licensee was unable to decontaminate them adequately to allow shipment to Rosemount; Rosemount does not have facilities for working on contaminated equipment. The licensee

and the vendor were seeking a third party which could both accept the transmitters in their contaminated state and perform the necessary analysis.

In conclusion, maintenance activities observed during this inspection period were conducted well. The inspectors found that management oversight of a number of sensitive activities was excellent and that personnel developing and executing corrective actions exhibited competence and professionalism.

5. Engineering Support (37551)

Onsite Followup of Engineering LERs (90712)

(Closed) LER 335/94-06, Containment Integrity Outside of FSAR Assumption Under Limited Circumstances Due to Design Error.

This LER was submitted November 2. The inspector reviewed and evaluated the licensee's initial corrective actions (LER items 1 through 7) in IR 335,389/94-22. At that time the licensee was evaluating the long term solution to the problem (preparing a modification to be installed during the 1994 refueling outage), performing an assessment of the safety consequences and implications of the design deficiency, and preparing to share the lessons learned with industry.

Additional piping to physically separate the common NaOH header was installed during the Unit 1 refueling outage. The inspector reviewed the design change package and performed several system walkdowns to observe in-process work. The inspector noted that several problems were experienced while welding the modified piping. QC believed that the problems occurred due to residual moisture in the lines and inadequate purge gas flow. The inspector verified that all of the above problems were reworked and corrected and the modification was completed and satisfactorily tested prior to Unit 1 restart.

JPN engineering performed an assessment of the safety consequences and implications of the design deficiency. This assessment JPN-PSL-SENP-94-079 considered three cases of a large break LOCA and one case for a small break LOCA (2"). In the large break LOCA cases, a path to vent an idle ECCS loop to the RCS was identified. Under the assumed conditions of a large break LOCA coincident with a loss of offsite power and an EDG failure, the pressure which would result in the common ECCS suction line of the idle train (due to the eductor cross connection) was found to transmit through the idle LPSI pump into the RCS. This path offered less resistance to flow than the relief valves in question. The vent path would be available following the blowdown phase of the accident.

In the small break LOCA case operator action would be required to change system alignments or activate equipment to prevent excess leakage from the relief valves into the ECCS equipment rooms. Since this action is addressed in EOPs it was also considered to be a success path. The above

evaluation was discussed in detail in LER 335/94-06 supplement 1 submitted by the licensee on December 2, 1994.

The inspector reviewed the LER and supplement, the engineering evaluation, and the LPSI system pressurization response due to common NaOH injection crosstie (calculation (PSL-IFJM-94-19)) to verify that the relief valves would not lift during a large break LOCA. The inspector also attended several management and FRG meetings where this issue was discussed in detail. The inspector concluded that, although an error was made in the design and installation of this system in 1978, the licensee's engineering evaluation clearly demonstrated that it represented only minor safety significance under the conditions of a LOCA, a loss of offsite power and the failure of one EDG. Under those conditions, if operators followed the guidance of the EOP, they would be able to identify and resolve leakage into an ECCS pump room that would occur.

This item was identified by the licensee. Upon identification their corrective action was thorough, timely, and complete. The licensee failure to verify the adequacy of the design of the NaOH system represents a violation of 10 CFR 50 Appendix B Criterion III. This violation will not be cited because the licensee's efforts in identifying and correcting the violation meet the criteria specified in Section VII.B of the NRC enforcement policy. It will be identified as NCV 335/94-25-01, Inadequate Design Control.

The inspector also verified that the licensee had informed the responsible AE of this event and shared this information with other utilities through the INPO Nuclear Network.

In conclusion, the inspectors found engineering's analysis of the significance of, and corrective actions to, the issue of NaOH eductor cross connection to be thorough and of appropriate depth.

6. Plant Support (71750)

a. Fire Protection

During the course of their normal tours, the inspectors routinely examined facets of the Fire Protection Program. The inspectors reviewed transient fire loads, flammable materials storage, housekeeping, hazardous chemical controls, ignition source/fire risk reduction efforts, fire protection training, the fire protection system surveillance program, fire barriers, fire brigade qualifications, and QA reviews of the program. No deficiencies were identified.

The inspector observed a fire drill on December 13 that exercised the plant fire brigade, communication with outside assistance (911), and fire fighting assistance provided by St. Lucie County.

The drill fire alarm was sounded at 9:00 am and identified a fire in a chemical storage area on the south side of the plant. The plant fire brigade arrived on site at 9:09 am. At 9:10 am they requested outside assistance. This assistance, a fire truck and five firefighters, arrived on the scene at 9:14 am. At 9:17 am all hoses were charged and both teams commenced fighting the drill fire. Approximately 20 gallons of AFFF were used in this practice exercise.

A critique was held at the end of the exercise to discuss any identified weaknesses and address any needed improvements.

The inspector found the site and offsite team responses to be very timely with excellent cooperation between the on and off-site teams. Personnel appeared on the scene fully dressed out and all equipment operated correctly. The offsite fire team is located at a fire station in the close proximity of the plant. Their timely response was exemplary. Site security provided assistance as needed to permit orderly entry of the offsite assistance. They additionally secured the drill area and directed all site traffic away from the drill area. Overall, the drill effort was considered excellent.

b. Physical Protection

During this inspection, the inspector toured the protected area and noted that the perimeter fence was intact and not compromised by erosion or disrepair. The fence fabric was secured and barbed wire was angled as required by the licensee's Physical Security Plan (PSP). Isolation zones were maintained on both sides of the barrier and were free of objects which could shield or conceal an individual.

The inspector observed personnel and packages entering the protected area were searched either by special purpose detectors or by a physical patdown for firearms, explosives, and contraband. The processing and escorting of visitors was observed. Vehicles were searched, escorted, and secured as described in the PSP. Lighting of the perimeter and of the protected area met the .2 foot-candle criteria. The testing of the uninterruptable power supplies to the security system was verified to have been tested during the Unit 1 and 2 refueling outages, as required by the PSP.

In conclusion, selected functions and equipment of the security program were inspected and found to comply with the PSP requirements.

c. Radiological Protection Program

Radiation protection control activities were observed to verify that these activities were in conformance with the facility policies and procedures, and in compliance with regulatory requirements. These observations included:

- Entry to and exit from contaminated areas, including step-off pad conditions and disposal of contaminated clothing;
- Area postings and controls;
- Work activity within radiation, high radiation, and contaminated areas;
- Radiation Control Area (RCA) exiting practices; and,
- Proper wearing of personnel monitoring equipment, protective clothing, and respiratory equipment.

No violations or deviations were identified.

In conclusion, the inspectors found that plant support activities continued to be conducted well. Fire brigade performance during a drill involving off-site support from the county was considered excellent.

7. Other Areas

TI 2515/126 Evaluation of On-line Maintenance

The inspector reviewed the following licensee procedures and schedules to identify established plant controls for conducting on-line maintenance:

- ADM-08.02, Rev 2, Conduct of Maintenance
- AP-0006126, Rev 2, The Coordination of Operations and Maintenance department Activities at St. Lucie Plant
- AP-0005746, Rev 6, Outage Management
- AP-0010460, Rev 1, Critical Maintenance Management
- Unit 1 and Unit 2 Surveillance Schedule for first quarter 1995
- Unit 1 and Unit 2 November 1994 work schedules
- Unit 1 and Unit 2 Plan of Day (2 day) work schedules for weeks of November 28 and December 12, 1994

The above procedure and schedule review found that the Outage Management Procedure (AP-0005746) addressed risk and provided contingency requirements for certain outage activities such as reduced RCS inventory and a loss of shutdown cooling. ADM-08.02, Conduct of Maintenance, and AP-0006126, Coordination of Operations and Maintenance Department Activities at St. Lucie Plant provided instructions on how maintenance was to be planned, coordinated, and conducted but did not discuss planning and scheduling to the level of detail that included an evaluation of risk associated with system or component maintenance activities.

Procedural/Schedule reviews and discussions with outage management personnel revealed that, in the past, the licensee had relied on experienced personnel assigned to ensure that on-line maintenance and surveillance activities were planned, prioritized, and conducted in an organized manner to minimize the impact on the plant, equipment out-of-service time, and to keep site personnel informed of the scheduled activities. To accomplish this the following coordination meetings were conducted:

- Morning and afternoon meetings on normal working days. These meetings covered the two and seven day work list, emergent activities, and TS action-statement entry work.
- Weekly meeting - covered a 7 day look ahead.
- Planned maintenance schedule using P-2 computer format with two week look ahead.

In each of the above meetings, all work was discussed and adjustments were made in the schedule as needed for emergent items. No procedural guidance was provided, but it was expected that experienced personnel from operations, maintenance, and planning would ensure that work was scheduled and accomplished with minimal impact on plant safety. Since permission was to be received from operations prior to work commencement, operations was relied upon to ensure that TS requirements were met.

Inspection efforts in August and September 1994 identified the performance of on-line maintenance on critical ECCS suction valves that rendered an entire train of ECCS equipment inoperable. These activities were being accomplished to meet the requirements of NRC GL 89-10. During inspection activities associated with the above, the inspector found that the majority of operations, planning, and scheduling personnel were not familiar with, and had not received significant training on, the plant's IPE. The above inspection results were documented in IR 335,389/94-20.

As a result of the above, the licensee developed AP-0010460, "Critical Maintenance Management," to provide guidance on voluntary entry into LCO Action Statements for the performance of maintenance activities. This procedure addressed voluntary maintenance on equipment specifically required by an LCO; however, invoking the procedure was not required for: equipment removed for service for TS surveillance testing; forced entry into an LCO AS due to equipment failure; and routine preventive maintenance required more frequently than 18 months that did not result in significant risk.

The use of this procedure required that the increased safety risk during the period in which equipment is not available due to on-line maintenance must be offset by the decreased safety risk gained by the improved reliability of the equipment following the on-line maintenance. If, in management's qualitative judgement, the increased safety risk could be offset by appropriate contingencies and increased oversite during the on-line maintenance, the described cost/benefit connection was not required.

The procedure also required that:

- The planning organization group associated maintenance activities to prevent repetitive entry into a given LCO AS.

- The LCO activity be scheduled for completion in less than 50 percent of the LCO allowable outage time. If the activity was scheduled for greater that 50 percent of the LCO, the NPS or plant management was to ensure that adequate contingencies and preparations were in place to ensure the LCO action statement time was not exceeded.

- An assessment of the impact on relative risk or reliability be accomplished. This could include an analysis of the impact on core damage probability using probabilistic risk assessment/probabilistic safety assessment techniques.

- A management assessment be performed of qualitative factors such as recent plant or safety system performance, plant conditions, contingency planning, expected effects upon system on plant reliability, potential impact on shutdown risk, and any applicable quantitative risk assessment results.

- The activity be schedule for (and executed with) continuous work until completed to minimize time in the LCO AS.

- Contingency planning be accomplished and the results incorporated into the work package.

- A prejob tailboard meeting be conducted to cover work activity, contingencies, and expectations.

- The licensee perform a site engineering review and assessment of the activity and perform periodic walkdowns of the activity to maintain current status and ensure configuration control. System engineers were also to perform a technical review of the work and track the safety and reliability of the affected and unaffected system components.

- Department supervision and plant management be involved in oversite of the activity.

- The activity be approved by the NPS.

- Availability of opposite train and/or components be verified.

- Scheduling and execution of the clearance process be expeditious.

The above procedure also contained checklists to verify that the necessary actions were completed and documented for on-line maintenance activities.

This procedure was implemented in October 1994. Work under this procedure was inspected and documented in IR 335,389/94-22 in November 1994. Minor discrepancies were noted but, overall, the inspector found that the use and methodology was effective in establishing cognizance of the safety impact of planned maintenance and in coordination of work to minimize time in TS AS.

Additional discussions with the licensee found that they plan to develop guidelines and methods to provide a risk assessment of all on-line planned maintenance activities. This is scheduled to be accomplished in the first quarter of 1995. TI 2515/126 is closed.

8. Exit Interview

The inspection scope and findings were summarized on December 30, 1994, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection results listed below. Proprietary material is not contained in this report. Dissenting comments were not received from the licensee.

| Type | Item Number | Status | Description |
|---|---|---|---|
| NCV | 50-335/94-25-01 | Closed | Inadequate Design Control, paragraph 5.a. |
| LER | 50-335/94-006 | Closed | Containment Integrity Outside of FSAR Assumption Under Limited Circumstances Due to Design Error, paragraph 5.a. |

9. Abbreviations, Acronyms, and Initialisms

| | |
|---|---|
| ADM | Administrative Procedure |
| AE | Architect/Engineer |
| AFFF | Aquious Film Forming Foam |
| ANPS | Assistant Nuclear Plant Supervisor |
| AP | Administrative Procedure |
| AS | Action Statement |
| CEA | Control Element Assembly |
| ECCS | Emergency Core Cooling System |
| EOP | Emergency Operating Procedure |
| ESF | Engineered Safety Feature |
| ESFAS | Engineered Safety Feature Actuation System |
| FSAR | Final Safety Analysis Report |
| FW | Feedwater |
| GL | [NRC] Generic Letter |
| GV | Governor Valve |
| INPO | Institute for Nuclear Power Operations |
| IPE | Individual Plant Examination |
| IR | [NRC] Inspection Report |
| JPN | (Juno Beach) Nuclear Engineering |
| LCO | TS Limiting Condition for Operation |
| LER | Licensee Event Report |
| LOCA | Loss of Coolant Accident |
| LOI | Letter of Instruction |
| LPSI | Low Pressure Safety Injection (system) |
| LVDT | Linear Voltage Differential Transformer |
| MSIS | Main Steam Isolation Signal |
| MSL | Main Steam Line |
| MSR | Moisture Separator/Reheater |
| MTC | Moderator Temperature Coefficient |
| NaOH | Sodium Hydroxide |
| NCV | NonCited Violation (of NRC requirements) |

| | |
|---|---|
| NI | Nuclear Instrument |
| NOED | Notice of Enforcement Discretion |
| NPS | Nuclear Plant Supervisor |
| NRC | Nuclear Regulatory Commission |
| OP | Operating Procedure |
| PSL | Plant St. Lucie |
| PSP | Physical Security Plan |
| PWO | Plant Work Order |
| QA | Quality Assurance |
| RCO | Reactor Control Operator |
| RCS | Reactor Coolant System |
| RPS | Reactor Protection System |
| RTD | Resistive Temperature Detector |
| RWP | Radiation Work Permit |
| RWT | Refueling Water Tank |
| SIAS | Safety Injection Actuation System |
| SNPO | Senior Nuclear Plant [unlicensed] Operator |
| St. | Saint |
| TI | [NRC] Temporary Instruction |
| TS | Technical Specification(s) |
| VDC | Volts Direct Current |
| VHPT | Variable High Power Trip |