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

Report Nos.: 50-335/94-09 and 50-389/94-09

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: February 27 - March 26, 1994

Inspectors:

S. A. Elrod, Senior Resident Inspector	4/28/94 Date Signed
T. Johnson, Senior Resident Inspector	4/28/94 Date Signed
M. S. Miller, Resident Inspector	4/28/94 Date Signed
M. A. Scott, Resident Inspector	4/28/94 Date Signed
L. Trocine, Resident Inspector	4/28/94 Date Signed
R. Schin, Project Engineer	4/28/94 Date Signed

Approved by: for K. D. Landis, Chief 4/28/94 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 review, Unit 2 refueling observations, surveillance observations, maintenance observations, outage activities, and fire protection review.

Backshift inspection was performed on February 28 and March 1, 2, 3, 13, 15, 16, 17, 19, and 20.

Results: Plant Operations area:

Operators performed Unit 2 reduced inventory operations well. Unit 1 operations continued to be good. One non-conservative licensee entry into a technical specification limiting condition for operation action statement was identified, involving emergency diesel generator fuel oil tank level. Failure to follow refueling procedures resulted in a failed attempt to grapple a fuel assembly due to bridge mispositioning. (paragraphs 3 and 4)

Maintenance and Surveillance area:

Maintenance activities, both normal and outage related, were generally conducted well. Several procedural weaknesses were identified and were addressed by the licensee. Surveillances were performed satisfactorily; However, operator and procedural weaknesses were identified during an EDG surveillance run. (paragraphs 5, 6, and 7)

Plant Support area:

Health Physics coverage of outage-related maintenance was strong, as was health physics personnel response to a spill of potentially contaminated water. (paragraphs 3 and 6)

One non-cited violation (NCV) and two unresolved items (URIs) were identified:

NCV 50-389/94-09-01, Incorrect Grappling of a Fuel Assembly, paragraph 4.a.

URI 50-389/94-09-02, Adequacy of a Single Operator on the Refueling Bridge During Core Alterations, paragraph 4.a.

URI 50-389/94-09-03, Adequacy of Review and Approval of Refueling Core Alterations, paragraph 4.a.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

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

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

NRC Personnel

* S. Elrod, Senior Resident Inspector
* M. Miller, Resident Inspector
T. Johnson, Senior Resident Inspector, Turkey Point
M. Scott, Resident Inspector, Farley
L. Trocine, Resident Inspector, Turkey Point
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 and ended the inspection period at 100 percent power. At the end of the inspection, the unit was in day 75 of power operation since startup on January 10, 1994.

b. Unit 2

Unit 2 began the inspection period shut down in operational mode 6 with the reactor disassembled and being refueled. At the end of the inspection, refueling had been completed and the unit was in cold shutdown, Mode 5, completing other overhaul work.

c. NRC Activity

An inspection of electrical maintenance and station blackout implementation was conducted from February 28 to March 4 by G. MacDonald and R. Moore of NRC Region II. The inspection results were reported in IR 335,389/94-06.

An inspection of the radiation protection program was conducted from February 28 to March 4 by D. Forbes of NRC Region II. The inspection results were reported in IR 335,389/94-07.

W. Rankin, Chief, Facilities Radiation Protection Section, NRC Region II, visited the site on March 3 and 4. His activities included a site tour, discussions with licensee management, and an overview of radiation protection inspection 335,389/94-07.

An inspection of inservice inspection, erosion/corrosion, snubber surveillance, and modifications to the pressurizer pressure relief valve discharge piping were conducted from March 7 to 11 by B. Crowley and J. Lenahan of NRC Region II. The inspection results were reported in IR 335,389/94-08.

An inspection of Unit 2 pressurizer steam space instrument nozzle weld repairs was conducted from March 21 to March 24 by J. Coley and B. Crowley of NRC Region II. The inspection results were reported in IR 335,389/94-10.

3. Review of Plant Operations (71707)

a. Plant Tours

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 partial 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 CCW platforms,
- Unit 2 ECCS spaces (2A LPSI pump overhaul and 2B LPSI motor replacement, and several MOV tests in particular),
- Unit 2 AFW spaces,
- Unit 2 containment (including temporary RCS level instrumentation prior to midloop operations),
- Unit 1 containment spray trains A and B, and
- Unit 2 spent fuel pool

(1) Misplaced Neutron Shielding

While touring the RCA, the inspector noted that the CVCS letdown radiation monitor was partially encapsulated in paraffin shielding. The monitor is located adjacent to the CVCS boronometer, which employs a neutron source to measure soluble boron concentration in the letdown process fluid. As paraffin is considered a neutron shield, the inspector questioned the licensee as to its placement over the radiation monitor, which contains no neutron source. After investigating, the licensee found that the intended location of the paraffin was, in fact, around the boronometer and that the paraffin had been moved. The licensee also stated that the area was surveyed for neutron dose prior to restoring the paraffin shielding and that neutron dose was within the bounds posted at the boronometer.

(2) Minor Spill Caused By Deficient Clearance

While touring the Unit 2 RAB, the inspector witnessed the licensee's initial cleanup of a spill in the ECCS room on March 8. When maintenance personnel loosened the packing on HCV-3635 (the MOV for LPSI B header to loop 2B1), water gushed out a drain line and overcame the temporary catch container and hose. About 40 gallons of water spilled onto the floor. A HP

supervisor and a cleanup person responded promptly and limited the spread of the water. This included cutting a hole in a maintenance work area plastic sheet that was covering a floor drain. The HP cleanup was good - there were no personnel contaminations and the area was cleaned up and decontaminated within about an hour.

The inspector reviewed clearance order 2-94-03-063 for the work on HCV-3635. It included a freeze seal, two open drain valves, an open vent valve, and other mechanical and electrical isolations. However, drawings showed that the vent valve was on the opposite side of HCV-3635 from the drain valves and the freeze seal. The position of HCV-3635, a normally closed valve, was not specified on the clearance. As a result, the section of pipe between HCV-3635 and the freeze seal was not properly vented and was not completely drained prior to starting work. When the maintenance personnel loosened the packing, they created a vent path that allowed more water to drain from the pipe, resulting in the spill.

The inspector concluded that the spill was caused by a deficient clearance. However, the safety consequences were minimal. The HP cleanup of the spill was very timely and effective.

b. Plant Operations Review

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 this inspection period, the inspectors reviewed the following tagouts (clearances):

- 2-94-02-105 Unit 2 MV 08-13 (AFW pump steam supply),
- 2-94-02-314 Unit 2 2A Containment Spray pump [partial lift of the clearance for the initial pump run],
- 2-94-02-217 Unit 2 pressurizer heaters,
- 2-94-02-159 Unit 2 reactor head vent valve V1470 [Locked Closed],
- 2-94-03-026 2B HPSI pump motor, and
- 2-94-03-017 2B EDG

(1) Reduced RCS Inventory at St Lucie Unit 2.

Unit 2 entered a reduced RCS inventory condition on March 16-17 to support the Unit 2 refueling outage. The following items were observed on March 15-17 in preparation for this evolution:

- Containment Closure Capability - Instructions were issued to accomplish this; tools were on station. The maintenance hatch was closed for setting the reactor head.

- RCS Temperature Indication - The reactor head was off at the time but plans included mode 1 CETs be available for indication when the head was set (two required per procedure).

- RCS Level Indication - Independent RCS wide and narrow range level instruments, which indicate in the control room, were operable, but the narrow range instrument was presently overranged due to actual water level. An additional Tygon tube loop level in the containment was installed and personnel were assigned for mid-loop operations and while changing levels.

- RCS Level Perturbations - Applicable plant procedures required that, when RCS level was altered, additional operational controls were invoked.

- RCS Inventory Volume Addition Capability - Applicable plant procedures required that two LPSI pumps be available and that either a HPSI pump or a charging pump be available as a backup. The inspector found that two LPSI pumps were in operation (shutdown cooling mode) and that the A HPSI and the A Charging pumps were both available as backup.

- RCS Nozzle Dams - The nozzle dams were currently installed and would be removed during this evolution.

- Vital Electrical Bus Availability - Operations would not release busses or alternate power sources for work during the evolution and work being conducted in the switchyard was prohibited by procedure. Two EDGs were operable.

- Pressurizer Vent Path - The inspector verified that the manway atop the pressurizer had been removed to provide a vent path. A screened barrier was installed to prevent personnel or debris entry.

- Operators verified that the reactor had been subcritical for a minimum of 120 hours and that two containment fan coolers were in operation, as required by procedure.

The inspector found operator knowledge of the upcoming evolution to be excellent.

c. Technical Specification Compliance

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.

(1) Non-conservative Entry Into TS LCO Action Statement

During a review of operator logs, the inspector noted that the 1A EDG had been declared inoperable for eight hours (5 a.m. to 1 p.m.) on March 7, 1994, due to a low fuel oil tank level. At the time, Unit 1 had been operating in Mode 1. Unit 1 TS 3.8.1.1 required restoring the EDG to operable within 72 hours or shutting down the unit.

The inspector inquired into the necessity and safety benefit of placing the 1A EDG in a TS LCO action statement and the licensee's review process that led to and approved this action. Unit 1 TS 3.0.1 Basis states: "It is not intended that the shutdown action requirements be used as an operational convenience which permits (routine) voluntary removal of a system or component from service in lieu of other alternatives that would not result in redundant systems or components being inoperable." Logs and operator statements indicated that the licensee had pumped fuel oil from the 1A EDG tank (to below the TS-required level) into the 2A EDG tank to bring the 2A tank within the TS-required range so that the 2A EDG could be declared operable following maintenance and testing. At the time, Unit 2 had been shut down in a refueling outage. After the 2A EDG had been restored to operable, the licensee had pumped fuel oil from the 2B EDG tank to the 1A EDG tank, restoring the 1A EDG to operable and placing the 2B EDG out of service with a low fuel oil tank level. Later in the week, the licensee received a truckload of oil into the 2B EDG tank.

The inspector found that licensee chemistry personnel monitored the four onsite EDG fuel oil tank levels and made recommendations to operations management on moving oil from tank to tank or receiving a truckload of oil. The Unit 1 and Unit 2 Shift Supervisors were not directly involved in this process. However, the operations management person who made the oil transfer decisions (based on verbal recommendations

from Chemistry) was a licensed SRO. Chemistry and operations management considerations included: 1) A truckload of oil was 7000 to 7500 gallons - purchase of smaller quantities was not done because it was more expensive. 2) Offloading an entire truckload of oil into one tank was desirable, to avoid potentially contaminating more than one tank. 3) Each of the four onsite EDG fuel oil storage tanks had about 3,000 gallons of room between the TS-required volume of oil and the overflow level. 4) Licensee procedures provided for routinely pumping one tank below its TS-required level in preparation for receiving a truckload of oil. 5) With the installed fuel transfer piping, oil could be transferred among the four tanks. 6) Operations management wanted to minimize the number of oil transfers between tanks to reduce the chance for related personnel errors. 7) Chemistry personnel judged that, in this instance, there was not enough oil in the 2B tank to bring the 2A tank above the TS-required level before bringing the 2B tank below the TS-required level. 8) Operations management did not want to risk having both of the Unit 2 EDGs inoperable at the same time.

Unit 1 & 2 OP 2200021, Transferring New Diesel Fuel Oil, stated: "Maintain TS minimum level in all diesel oil storage tanks unless taking one diesel oil storage tank low to make room to receive new diesel fuel oil." When transferring fuel oil between two tanks, an operator was stationed at each tank with radio communication to minimize the chance of inadvertently pumping a tank too low or overflowing a tank. As shown in drawing 8770-G-086, Flow Diagram Misc. Services, the fuel transfer piping was designed to withstand a seismic event. Also, the piping delivered fuel into the top of each tank, minimizing the chance of a piping failure causing loss of fuel from a tank.

The inspector reviewed EDG fuel oil tank levels recorded on the morning of March 7, TS requirements, operating procedure requirements, alarm setpoints, and overflow levels (in gallons):

	1A	1B	2A	2B	TOTAL
March 7 tank levels	18,383	18,846	37,338	43,494	118,061
TS minimum required	16,450	16,450	40,000	40,000	112,900
OP stated TS min.	17,058	17,058	40,729	40,729	115,574
Alarm setpoint	17,058	17,058	40,729	40,729	115,574
Overflow level	20,000	20,000	43,995	43,995	127,990

The inspector concluded that, on the morning of March 7, there was enough oil on site in the four EDG fuel oil tanks to have all four tanks above the TS-required minimum and above the alarm setpoint. Since the licensee recorded tank levels in feet and inches, the number of gallons available on site may not have been clearly evident to operations management. (The

above gallon numbers for each tank were converted from feet and inches by the inspector.) The inspector found no clear necessity or net safety benefit in pumping the 1A EDG fuel oil tank level down below its TS-required minimum. In this case, placing the 1A EDG in a TS LCO action statement was a non-conservative action by the licensee.

Also, the inspector found that the licensee tracked and reviewed overall unavailability of certain safety systems, but did not track or review overall time in LCO action statements for any safety systems. Unavailability and inoperability are substantially different. For example, in this case the 1A EDG was considered to be inoperable for eight hours but was also considered to be available during the same time.

d. Physical Protection

The inspectors verified by observation during routine activities that security program plans were being implemented as evidenced by: proper display of picture badges; searching of packages and personnel at the plant entrance; and vital area portals being locked and alarmed.

In conclusion, operations for this inspection period were conducted satisfactorily. Operator knowledge and control of Unit 2 reduced inventory operations were considered to be excellent. One licensee voluntary entrance into a TS LCO action statement, involving EDG fuel oil tank level, was considered to be non-conservative.

4. Unit 2 Refueling Observations (60710)

The inspectors reviewed the licensee's refueling activities and operations including surveillance testing, operating procedures, TS compliance, shift manning, reactor engineering involvement, management and supervision oversight, plant conditions, housekeeping, and loose object control.

a. Unit 2 Refueling and Core Shuffle

The licensee commenced Unit 2 refueling and core shuffle activities on February 28, 1994. The inspectors monitored refueling from the control room, the spent fuel area and the refueling bridge. During fuel movement, the licensee controlled the move sequence by using a Recommended Move List. This list was part of the core reload PC/M 001-294 for Unit 2 Cycle 8. Fuel movement operations were controlled by procedures OP 2-1630024, Refueling Machine Operations, and Test Procedure 3200090, Refueling Operations. The test procedure referenced the Recommended Move List and described the steps necessary to deviate from this list.

On February 28, 1994, at 11:43 a.m. refueling operations were stopped during an attempt to grapple assembly H08 in core location

G11. The hoist overload energized several times during the upward hoist motion attempts. The licensee discovered a typographical error in the Recommended Move List at step 27. The core coordinate for the bridge was listed as 787.71 and should have been 783.71. Consequently, the bridge was misaligned by approximately 4 inches. The licensee surmised that the grapple engaged the assembly off center and upward movement was arrested due to actuation of the hoist overload. The refueling SRO directed reactor engineering to check for additional errors in the Recommended Move List. Three more errors were found and corrected.

In followup to this error, the inspector reviewed operating procedure No. 2-1630024, "Refueling Machine Operation". In order to assure the operation has the correct core location, a comparison check of rough mechanical alpha-numeric grid coordinates was directed. Then, a more exact coordinate was to be made using the digital bridge and trolley indicators. The operator, during move number 27 for assembly H08 in core location G11, did not ensure that the two coordinates checked were in agreement prior to attempting to grapple the fuel assembly. Consequently, the typographical error in the Recommended Fuel Movement List caused the operator to grapple the assembly in an incorrect position.

The licensee stated that the operator in question was recently qualified and his experience may have been a causal factor. Step 8.2.11.B.3.b of procedure 2-1630024 requires the operator to ensure that the mechanical indicator for the core coordinates agree with the bridge and trolley digital readouts. TS 6.8.1.a and b, and Regulatory Guide 1.33, Revision 2, February 1978, Appendix A, items 2k and 2l require procedures for refueling and core alteration to be written, implemented, and maintained. Due to the minor safety significance of this error and the licensee's prompt corrective action, this violation will not be subject to enforcement action because the licensee's efforts in identifying and/or correcting the violation meet the criteria specified in Section VII.B of the NRC Enforcement Policy. The failure to adequately follow procedure 2-1630024 in conjunction with the error in the Recommended Move List are identified as NCV 50-389/94-09-01, Incorrect Grappling of a Fuel Assembly.

The inspectors reviewed the appropriate logs including the RCO log book, the refueling log and others. During the February 28, 1994, refueling error associated with step 27, the RCO log book stated that the fuel movement had stopped (for almost 4 hours); however, the reason was not stated. Further, the restart of refueling (at approximately 3:52 pm) was logged in the RCO log book. The inspectors discussed this issue with operations and plant management.

On March 1, from approximately 11:00 a.m. to 1:30 p.m., the inspectors observed refueling operations from the containment including the refueling bridge and from the area of the spent fuel

pool. During this time, an additional error in step 61 of the Recommended Move List was noted by the licensee in that the fuel movement sheets incorrectly indicated that no CEA was in the fuel assembly. The licensee corrected this error.

During this time, the inspector noted that only one licensed operator was on the bridge performing refueling operations. TS 6.2.2.d requires that all core alterations be observed by a licensed operator and supervised by an SRO with no concurrent responsibilities. This SRO may be in the control room, the refueling bridge, or the spent fuel pool area. The inspector questioned the validity of having only one person on the refueling bridge, and whether this meets the intent of a licensed operator "observing core alterations". The licensee's position was that a single operator met this requirement. However, considering the error noted above, a second person checking or observing could have prevented this. Pending further NRC review, this issue is identified as URI 50-389/94-09-02, Adequacy of a Single Operator on the Refueling Bridge during Core Alterations.

The inspectors noted that the Recommended Move List and changes were not specifically reviewed by the FRG nor approved by the Plant Manager, but instead were approved by the reactor engineering supervisor. Each movement is also a core alteration. TS 6.8.1 requires procedures for refueling operations and core alterations. TS 6.8.2 requires those procedures to be FRG reviewed and plant manager approved. Pending further NRC review, this issue is identified as URI 50-389/94-09-03, Adequacy of Review and Approval of Refueling Core Alterations.

The inspectors discussed these concerns with licensee management and on March 2, at about 10:30 am, the licensee suspended refueling operations. The licensee initiated the following corrective actions:

- Revision of Test Procedure 3200090 to incorporate the Recommended Move List in the procedure and to track changes to the Recommended Move List in an Appendix to the procedure.
- Revalidation of the Recommended Move List.
- FRG review and approval of the Recommended Move List per TCs 2-94-076 and 077.
- Initiation of a formalized deviation sheet signoff for Fuel Movement Changes.
- Documented qualifications of each refueling operator.
- Implemented infrequent evolution process, including detailed briefing, per AP 0010020.
- Stressed the importance of RCO log keeping during briefings.
- Added a second person on the refueling bridge to ensure proper fuel movements.

The inspector met with licensee management and attended the morning shift briefings on March 3. The inspectors verified corrective

actions and observed portions of the continuing refueling operations.

The inspectors also reviewed QA activities associated with the Unit 2 refueling. Based on discussions with QA management personnel, the inspector determined that QA had performed audits, surveillances and performance monitoring of refueling activities including:

- new fuel receipt,
- refueling preparations,
- TS compliance,
- monitoring of refueling activities in the control room, on the refueling bridge and in the SFP,
- procedure review, and
- CEDM unlatching.

Independent QC verification of the final core configuration and QA review of core physics testing were planned. QA/QC did not identify any deviations, violations, or problem areas. The inspectors observed that QA/QC were not present during the February 28, 1994, error nor during the times the inspectors were present in the refueling areas and facilities.

b. CEA Shuffle

Following correction of the refueling process, the inspector monitored portions of the CEA shuffle on March 10. After completing the fuel assembly shuffle per the approved Recommended Move List, the licensee moved CEAs to their new required positions. The inspector noted that, toward the end of the CEA shuffle, operators found that two CEAs had been mis-located. The reactor engineer then made changes to the core load procedure to locate and move CEAs to correct the condition. The inspector verified that the procedure allowed the reactor engineer to make these changes.

c. Core Load Verification

Immediately after the CEA shuffle, the inspector observed the Unit 2 core load verification. This evolution was conducted from the refueling crane, using an underwater camera suspended by a pole from the crane handrail and two video displays on the crane deck. Licensee personnel involved in the evolution included an SRO in charge, an RO crane operator, a reactor engineer, and a quality control inspector. The operators positioned the camera while the engineer and QC inspector each read and recorded the fuel assembly and CEA numbers. They also made a video tape record of this evolution.

The inspector noted that, while the numbers on the CEAs and new fuel assemblies were clearly legible, many of the numbers on the partially used fuel assemblies were obscured by corrosion and small flakes of loose metallic oxidation (the engineer stated that this

was from the CEA shuffle) and were very difficult to read. The engineer and QC inspector had to discuss and relook at many such numbers before they agreed on what the number was. After both had viewed, recorded, and agreed upon all CEA and fuel assembly numbers, they compared their recorded numbers with the approved core map from the core load procedure. Three of the fuel assembly numbers did not match. Then the camera was repositioned to each of those three fuel assemblies until the reactor engineer and the QC inspector agreed with the numbers from the approved core load map.

The inspector concluded that the licensee's core load verification was adequate but was hampered by fuel assembly numbers being obscured by corrosion and small flakes of loose metallic oxidation.

In conclusion, while evolutions were generally conducted satisfactorily, the inspectors found several aspects of the Unit 2 refueling operation to be of concern. These concerns were relayed to the licensee, and plant management adequately addressed the issues. Failure to properly prepare and follow refueling procedures resulted in a failed attempt to grapple a fuel assembly due to bridge mispositioning. Questions related to TS-required levels of staffing on the refueling bridge resulted in a URI.

5. 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 tests were observed:

a. OP 1-2200050B, "1B Emergency Diesel Generator Periodic Test and General Operating Instructions"

The inspector witnessed the performance of 1B EDG surveillance test performed March 16. The test was performed satisfactorily; however, the inspector noted weaknesses associated with operator performance and procedural adequacy.

In preparing to perform the surveillance test, step 4 of the subject procedure requires that the water level in both EDGs' radiator expansion tanks be checked. The inspector noted, immediately prior to the performance of this step, that the water level in the 1B1 expansion tank was out-of-sight high in the tank's level sight glass (the procedure required that the level be visible between two points marked on the sight glass). The inspector witnessed the SNPO performing this evaluation to observe the sight glass and initial

the "SAT" block of the procedure, indicating that the level was satisfactory. The inspector questioned the SNPO as to the acceptability of the level, after which the SNPO rechecked the level and acknowledged that it was too high. The apparent cause for the high level was an increase in weather-related ambient temperature which resulted in higher EDG LO and coolant temperatures and resultant coolant expansion.

The inspector noted that the procedure included instructions for correcting a low level condition, but did not address correcting high level conditions. The SNPO contacted the ANPS, as directed in the procedure, and the ANPS issued instructions for valve manipulations to reduce the level. This involved opening a drain valve to direct water from the expansion tank to a local drain collection point.

During the draining evolution, the system engineer present reported seeing air bubbles rising through the sight glass and the SNPO operating the drain valve reported hearing air flow noises in the vicinity of the collection point. The system engineer concluded that the tank was not vented and the ANPS was contacted for further directions. The ANPS directed that the draining be stopped and that a vent valve be opened, after which a prompt drop of approximately 1.5" was observed in tank level. The balance of the draining and surveillance testing occurred without incident.

The inspector concluded that the SNPO's failure to identify the high level in the radiator expansion tank constituted poor attention to detail. The inspector further found that the governing procedure was weak, in that it provided no guidance to operators attempting to drain the tank. The procedural weakness resulted in operators draining the tank for approximately 4 minutes without a vent path.

b. OP 2-2200050B, "2B Emergency Diesel Generator Periodic Test and General Operating Instructions."

Generally, surveillances were performed well; however, one case of inattention to detail and one procedural weakness were identified.

6. 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:

a. CWO 8143, Support of 2A CCW Heat Exchanger Work
NPWO 3573 Clean and Inspect 2A CCW Heat Exchanger

The majority of the work on the heat exchanger was done under the above NPWO and procedure MMP 14.01, Component Cooling Water Heat Exchanger Cleaning and Repair. During this outage, 73 newly identified leaking tubes were plugged, resulting in a total of 97 plugged tubes. This was approximately 8.5 percent of the total exchanger tubes. Engineering indicated that the plugging limit was 10 percent, with some slight available margin above that. Engineering was to revisit the plugging margin and consider replacing all tubes in this heat exchanger during the next outage.

The inspector reviewed the tube plugging map against the actual tubes plugged and examined the plug installation work. The work effort was found to be satisfactory. During the post-maintenance test, the tube ends at the tube sheets were exposed for observation and the HX CCW side pressurized at 150 psig for 10 minutes without signs of leakage. The inspector reviewed the test data sheet and found it to be satisfactorily completed.

b. NPWO 4865/62 Remove, Repair, Re-Install 2A LPSI Pump

Procedure 2-M-004, Rev 5, Disassembly/Reassembly of Low Pressure Safety Injection Pump, was the controlling instruction during the work. This work included removal and inspection of the pump, replacement of the mechanical seal, and re-installation of the pump. The inspector observed the conduct of rigging during re-installation of the pump, the retorquing of the casing studs and bolts, and the troubleshooting of the mechanical seal.

During the rigging of the pump internals and motor assembly preparatory to its installation, the licensee had to make three separate lifts to clear travel path obstructions from the repair location [laydown area] to the installed lower half of the pump casing. All of the lifts were within the ECCS space. The lower casing half had been left in the piping system. Due to limited description of the required rigging in the procedure, the mechanics had to make several adjustments in the rigging line lengths. To do these adjustments, the pump and motor had to be lifted three separate times to complete the translation. All adjustments were completed prior to movement of the pump and motor over the suction piping to the inservice 2B LPSI pump which was in the direct path of travel. The lift was in conformance to procedure AP 0010438, Control of Heavy Loads [i.e., the subject procedure had been reviewed and approved by the FRG prior to the lift]. But neither procedure discussed or cautioned the personnel performing the lift to the fact that the load path crossed the 2B LPSI pump suction

piping. The licensee was considering enhancements to the pump overhaul procedure.

The rigging did generally conform to the sketches in the base procedure and did conform to another applicable procedure. The rigging was properly sized and had appropriate inspection code markings of AP 0010443, St. Lucie Site Rigging Controls and Rigging Considerations. The text of procedure discussed using one 5 ton hoist to lift and lower the pump motor into the lower casing. The procedural sketch depicted two lift points. The licensee used two 6 ton hoists to provide motive force, which was more conservative than the minimum requirement [the pump and motor assembly weighed 9400 pounds]. The procedural loose description of the rigging attachment points and translational points was being reviewed by the licensee for upgrade.

During the torquing of the pump casing nuts and studs, the licensee discovered that the mechanical seal housing outer cap had been mis-installed. The cap would not align properly with the seal piping. The cap was 180 degrees from its appropriate orientation such that the seal piping could not be attached. The licensee was to change the procedure to allow an inplace rotation of the seal cap while the pump was installed in the casing. In this maintenance configuration [no water and the pump out of service on a clearance], no pump operation was possible.

The above seal cap mis-installation occurred due to a procedural weakness. The procedure discussed match marking of the seal and piping, which was performed during disassembly. However, the procedure did not refer back to the match marking or caution the maintenance personnel on the orientation necessities during the re-assembly process. The licensee was considering procedural enhancements in light of this problem.

c. NPWO 7250 NRC Generic Letter 89-10 Valve Work

This NPWO adjusted, repaired, and tested a number of critical plant valves that were addressed under the subject letter. The licensee has been progressing through work on these valves. During this outage, the licensee had scheduled 14 valves to be worked. The inspectors reviewed overall licensee plans and discussed the work scope.

The inspector observed the setup and testing of SDC heat exchanger cross-tie valve 3456. This Westinghouse valve did not close on a torque switch as did most valves in this group, but instead closed and opened on limit switches.

During initial testing of this valve, the motor to the valves's actuator failed. The motor had developed an electrical ground and opened the supply breaker to the actuator. This testing did detect the failure and provide a path for the replacement of the valve's

motor. The licensee had to plan a work package for the motor replacement prior to work proceeding.

d. NPWO 2512/62 2A Containment Spray Pump Gasket Replacement

This NPWO provided for the lifting of the pump, replacement of the casing gasket, and re-installation of the subject pump. The casing gasket had a small leak that had weeped during the last unit operating cycle.

The inspector observed the first post-maintenance pump run after system fill and vent. Health Physics personnel were on hand to assist in the case of emergent problems. An SRO and two non-licensed operators were on hand to observe the leak integrity of the pump [a functional test point in the pump's return to service] and to vent the seal package once the pump began to generate pressure. The pump and motor operated without any problems and the initial data [temperatures and vibration] collected by electrical personnel with the inspector present indicated that the motor was satisfactory.

e. NPWO 7305/66 Motor for 2A LPSI pump

This NPWO provided administrative control of the electrical determination, housing removal/re-installation, and re-termination of the 2A LPSI pump motor for the above indicated work [NPWO 4865].

The inspector observed portions of the satisfactory re-termination of the 4160 Volt electrical leads to the motor. MP 0930066, Rev 6, 4.16 KV, 6.9 KV, and 15 KV Termination Connections and Insulation, was the applicable principal procedure for the work. Health Physics coverage was timely and more than adequate.

f. NPWO 7303/66 2A HPSI Motor Work

The 2A HPSI motor was replaced with a spare motor. Additionally, as an operational improvement, the spare motor feet and pump motor mounting points on the pump skid were machined flat. This was done to reduce vibration levels on the motor that were identified during the previous two refueling outages to be slightly below the administrative limits established by the licensee. The previous vibrational anomalies were identified as being due to motor to skid flatness problems creating was is termed a "soft foot" or slightly sprung motor foot [attachment point].

The inspector observed, in part, the motor being mounted to the skid and its interim alignment to the pump, and the first [and satisfactory] uncoupled motor run. The applicable procedure for the motor work was MP 2-0950165, Rev 4, Overhaul of High Pressure Safety Injection Pump Motors HPSI PP - 2A and 2B. The motor vibrational levels and motor operation were also satisfactory and met the acceptance criteria. Health Physics support of the test was good.

Maintenance activities were generally well performed. Health Physics coverage for maintenance activities was considered good. Several procedural weaknesses were identified relating to LPSI pump repair.

7. Outage Activities (62703)

The following items were licensee commitments to the NRC or established critical goals for this outage that were observed by the site NRC inspectors.

a. AFW MOV Replacement (MV 08-12 and 08-13)

These steam supply valves to the steam driven AFW pump had previously been noted to have weakness in operation. Previously, the actuators and valves were identified as being undersized and the wrong type of valve and therefore marginal for their in-use application. Operational problems had occurred in 1993 and an increased testing and maintenance frequency had been pursued. The licensee was replacing these valves under PCM 173-293. The licensee upgraded the strength of the valves and size of the actuators. The inspector observed the satisfactory cut out of the old MV 08-13 valve and the end prepping of the piping for the installation of the new 08-13 valve. The valve had been pre-welded with stub pipes to facilitate installation into the existing overhead system piping which meant that two additional weld joints were added.

The inspector examined the installed new 08-12 valve. The valve to piping welds and general installation looked more than adequate. Some supports were to later be installed. During the installation, the motor on the actuator was bumped such that the motor casing had paint removed and was scratched. A motor end bell bolt was also bent. The inspector reported this to the electrical department and outage director for evaluation. The installation had yet to be accepted by the plant for operation.

b. S/G Nozzle Dam Replacement

The previously used nozzle dams had posed problems during years of use. The old style had leakage problems and installation had been not ALARA effective. A new design had been selected for use this outage.

c. MOV Generic Letter 89-10 Work (see maintenance section above)

d. Replace Rosemount Transmitters

The licensee letter L-93-61, dated March 5, 1993, gave the licensee response to NRC Bulletin 90-01, Supplement 1. The licensee was replacing a number of pressure transmitters (PTs) in response to this bulletin.

The inspector observed satisfactory "as-installed" state of the following PTs:

PT 1103	NPWO 8108
PT 1104	NPWO 8108
PT 1105	NPWO 8108

These new Rosemount PTs had been recently installed on or around the RCS pressurizer cubicle. These PTs had been selected on a random sampling basis. Tubing, electrical cabling, and mounting fasteners were inspected for satisfactory installation.

The licensee had installed at least five other PTs, had issued work orders to replace all other PTs, and were on schedule to complete all subject PTs by the end of the outage.

e. NPWO 8301/66, 2B Diesel Generator Inspection

The inspector observed portions of the 2B EDG mechanical and electrical inspections that were accomplished per NPWO 8301/66 and procedure MP 2-2200063, 2B Emergency Diesel Generator Periodic Maintenance. During these observations, the inspector noted a sharply bent cable inside an EDG control panel. The high side connection to a 25 KVA grounding transformer had a short length of bare copper cable that was bent sharply at about a ninety-degree angle. The inspector asked the electricians to check the cable for degradation, and they found that several of the small conductors were broken.

The electricians repaired the cable by cutting off the damaged end and installing insulation around the bare section of cable to support it and keep it from bending sharply. Engineers reviewed the condition and found that the degraded cable, with several small conductors broken, would have readily carried its design current.

In Unit 2 LER 92-006 of September 1992, the licensee attributed the cause of a fire in the 2C condensate pump motor electrical lead to a sharp bend in the cable, exceeding the minimum allowable bend radius. The licensee's corrective action for that event was focused on insulated electrical leads to pump motors. The inspector reviewed records of the licensee's training conducted in September 1992 following that event. The lesson plan was good, including a review of the event and copies of industry standards on minimum cable bend radius. Sixty-two electrical maintenance personnel signed the attendance roster for the training.

The inspector concluded that the degraded cable did not affect operability of the EDG and that the corrective actions from Unit 2 LER 92-006 should not have prevented the condition.

f. Weld Cracks on Pressurizer Instrumentation Nozzles

During outage work, the licensee found evidence that the "C" pressurizer level steam space instrument nozzle had been leaking during the operating cycle. The evidence consisted of boron deposits on the exterior of the pressurizer. There are four pressurizer steam space level instrument nozzles. They are fabricated from Inconel 690 and are joined to the pressure boundary by "J" welds on the interior of the pressurizer.

The licensee conducted visual and dye penetrant inspections of the welds in question. Results revealed unacceptable linear indications in three of the four welds. The licensee determined the most probable cause for the indications to be Primary Water Stress Corrosion Cracking (PWSCC) in conjunction with fabrication techniques employed in making the weld. Additionally, the licensee performed eddy current testing on the nozzles in question and determined them to be satisfactory.

The licensee's corrective actions involve a partial nozzle replacement process. The process involves cutting a given nozzle at a point between the "J" weld (on the inner pressurizer wall) and the outer pressurizer wall and removing the nozzle. A weld pad will then be created on the outer pressurizer wall using a tempered bead weld pass procedure and the pad will be prepared for a "J" weld. The nozzle will then be reinserted and a "J" weld will attach the nozzle to the pad. This method has the effect of extending the pressure boundary from the pressurizer inner diameter to the pressurizer outer diameter.

The licensee plans to affect the corrective action under their Plant Change/Modification process. The licensee is currently performing a stress analysis for the method to be employed. Because the planned corrective actions will result in returning to operation with unacceptable linear indications present in the three of the original four "J" welds, the licensee will submit a fracture mechanics safety analysis for NRC review and approval.

This activity is being inspected in detail by NRC Region II welding and materials inspectors and will be reported in IR 335,389/94-10.

In conclusion, major outage activities which were monitored by NRC inspectors were generally performed well. Licensee response to emergent work (e.g. pressurizer nozzles) was thorough.

8. Fire Protection Review (64704)

During the course of their normal tours, the inspectors routinely examined facets of the Fire Protection Program. The inspector reviewed flammable materials storage, housekeeping, control of hazardous chemicals, and ignition source/fire risk reduction efforts.

9. Exit Interview

The inspection scope and findings were summarized on April 25, 1990, 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 received from the licensee.

The licensee took issue with NCV 389/94-09-01. In this instance, an operator mispositioned the refueling machine and failed to grapple a fuel assembly due to incorrect coordinates in the Recommended Move List. The licensee stated that, while a cross check of machine coordinates following the move may have prevented the failed attempt to grapple, such a cross check was not procedurally required.

The licensee also took issue with URI 389/94-09-02. In this case, the inspector questioned whether a single licensed operator, performing core alterations on the refueling bridge, met the intent of the TS requirement for a licensed operator to "observe" core alterations. The licensee's position was that a licensed operator performing core alterations constituted the TS-required observer. The licensee indicated that they possessed NRC correspondence, generated during the original Unit 2 licensing process, which supported their interpretation.

The licensee also took issue with URI 389/94-09-03. In this case, the inspector found that the Recommended Move List (for fuel shuffle) was not reviewed by the FRG and was not approved by the plant manager. The licensee stated that the Recommended Move List's preparation, use, and modification were directed by an FRG-reviewed procedure and that an FRG review should not be required for the list.

Item Number	Status	Description and Reference
389/94-09-01	open	NCV - Incorrect Grappling of a Fuel Assembly, paragraph 4.a.
389/94-09-02	open	URI - Adequacy of a Single Operator on the Refueling Bridge During Core Alterations, paragraph 4.a.
389/94-09-03	open	URI - Adequacy of Review and Approval of Refueling Core Alterations, paragraph 4.a.

10. Abbreviations, Acronyms, and Initialisms

AFW	Auxiliary Feedwater (system)
ANPS	Assistant Nuclear Plant Supervisor
CCW	Component Cooling Water
CEDM	Control Element Drive Mechanism
CET	Core Exit Thermocouple
CFR	Code of Federal Regulations
CVCS	Chemical & Volume Control System

CWO	Construction Work Order
DPR	Demonstration Power Reactor (A type of operating license)
ECCS	Emergency Core Cooling System
EDG	Emergency Diesel Generator
ESF	Engineered Safety Feature
FPL	The Florida Power & Light Company
FRG	Facility Review Group
HCV	Hydraulic Control Valve
HX	Heat Exchanger
i.e.	that is
IR	[NRC] Inspection Report
JPN	(Juno Beach) Nuclear Engineering
KV	KiloVolt(s)
LCO	TS Limiting Condition for Operation
LER	Licensee Event Report
LPSI	Low Pressure Safety Injection (system)
MMP	Mechanical Maintenance Procedure
MOV	Motor Operated Valve
MV	Motorized Valve
NPWO	Nuclear Plant Work Order
NRC	Nuclear Regulatory Commission
NRR	NRC Office of Nuclear Reactor Regulation
OP	Operating Procedure
PCM	Plant Change/Modification
PSL	Plant St. Lucie
PT	Pressure Transmitter
QA	Quality Assurance
QC	Quality Control
RAB	Reactor Auxiliary Building
RCO	Reactor Control Operator
RCS	Reactor Coolant System
RO	Reactor [licensed] Operator
RWT	Refueling Water Tank
SDC	Shut Down Cooling
SFP	Spent Fuel Pool
SNPO	Senior Nuclear Plant [unlicensed] Operator
SRO	Senior Reactor [licensed] Operator
St.	Saint
TC	Temporary Change
TS	Technical Specification(s)
URI	[NRC] Unresolved Item
VIO	Violation (of NRC requirements)