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

Report Nos.: 50-335/90-17 and 50-389/90-17

Licensee: Florida Power and Light
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 Units 1 and 2

Inspection Conducted: July 16-20, 1990

Inspector: W. P. Kleinsorge, P.E. July 24, 1990
Date Signed

Approved by: J. J. Blake, Chief
Materials and Processes Section
Engineering Branch
Division of Reactor Safety
7/25/90
Date Signed

SUMMARY

Scope:

This routine, unannounced inspection was conducted in the areas of Unit 1 Reactor Pump (RCP) failure, Control Element Assembly (CEA) examination, material condition, and licensee actions on previous inspection findings.

Results:

In the areas inspected, violations or deviations were not identified. At this writing, the licensee is taking a conservative aggressive approach to the recovery from this RCP failure. Licensee management involvement and the licensee's technical staff assure that technical issues are resolved from a conservative standpoint. The licensee appears to be very sensitive to any NRC initiatives and the responses to these initiatives usually have good technical basis.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*G. Boissy, Plant Manager
J. Barrow, Operations Superintendent
*R. Church, Independent Safety Engineering Group Chairman
*C. Burton, Operations Supervisor
*D. Culpepper, Site Engineering Supervisor
*R. Dawson, Maintenance Superintendent
*J. Dyer, Quality Control Supervisor
*R. Englmeier, Quality Assurance Superintendent
*J. Geiger, Vice President for Nuclear Assurance
*C. Leppla, I&C Supervisor
*J. Riley, Information Services Supervisor
*L. Rogers, Electrical Maintenance Supervisor
N. Roos, Services Manager
D. Sager, St. Lucie Site Vice President
*J. West, Mechanical Maintenance Supervisor
*E. Wunderlich, Reactor Engineering Supervisor

Other licensee employees contacted during this inspection included engineers, mechanics, technicians and administrative personnel.

NRC Resident Inspectors

S. Elrod, Senior Resident Inspector (SRI)
M. Scott, Resident Inspector (RI)

*Attended exit interview

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

2. Licensee Actions On Previous Inspection Findings

(OPEN) Violation 50-335, 389/89-24-02: "Discrepant Maintenance Records"

FP&L letter of response dated February 22, 1990, has been reviewed and determined to be acceptable by Region II. The inspector held discussions with cognizant licensee personnel and examined the

corrective actions as stated in the letter of response. The inspector concluded that FP&L had not determined the full extent of the subject violation, and had not performed the necessary survey and follow-up actions to correct the present conditions, but has developed the necessary corrective actions to preclude recurrence of similar circumstances. The corrective actions identified in the letter of response have been implemented. The licensee only reviewed the specific examples noted in the inspection report from which the licensee determine that there were no safety significant record discrepancies. The licensee does not know whether similar conditions exist in other records (other than maintenance PWO packages) which might be safety significant. Until this can be determined, by the licensee, this item will remain open.

2. Unit 1 Reactor Coolant Pump (RCP) 1A1 Failure

As indicated by the licensee, at approximately 4:00 p.m. on June 30, 1990, Operations personnel noted an approximately 90 psig increase in the 1A1 RCP upper seal cavity pressure. By midnight, the pressure on the upper and middle seal cavities had begun to oscillate along with a slight increase in bleedoff flow and pump vibration. At 5:10 a.m. July 1, 1990, a Loose Parts Monitor (LPM) alarm came in on channel #6 (1A Steam Generator) concurrent with an increase in 1A1 RCP vibration. Monitoring frequency of the parameters was increased to once per hour. Seal pressure continued to fluctuate through the day with increases in bleedoff flow and vibration. At 2:25 p.m., the same day, another LPM alarm was received, on channel #6 which appeared to be valid. In the early morning hours of July 2, 1990, the upper and middle cavity seal pressure fluctuations became more severe and there was a significant increase in bleedoff flow from a normal value of 1.0 gpm to 3.5 gpm. A peak vibration reading of 9.0 mills was recorded. At 10:30 a.m., July 2, 1990, the licensee decided to commence an orderly shutdown of Unit 1. Over the period, July 2 - July 4, 1990, efforts were concentrated on preparations for seal replacement. On July 5, 1990, attempts to remove the motor shaft to pump shaft coupling spacer (spool piece) proved unsuccessful when it was found that the pump shaft would not drop down as the motor half coupling bolts were loosened. The coupling bolts were reinstalled and attempts to rotate the shaft were unsuccessful. Subsequently, the licensee has disassembled the pump and is proceeding down the parallel paths of repair (replacement of the rotating element of the 1A1 RCP) and root cause analysis of the 1A1 RCP failure.

At some point in time after the shutdown, the licensee noted that there was a steadily increasing trend in RCP vibration starting some time during the day of June 25, 1990.

The root cause analyses is aimed at four possible causes of failure: hydrostatic bearing (HSB) failure; pump shaft failure; seal failure; and impeller failure. Root cause analysis efforts to date include: 1A1 RCP maintenance history search; 1A1 RCP vibration history search; analysis of debris found in the 1A1 RCP; visual and nondestructive examinations (NDEs) of the 1A1 RCP rotating element; measurement of seal clearances; determination of seal wear vice HSB wear; and remote visual examination of adjacent Reactor Coolant (RC) piping.

The repair path is proceeding with the use of the Unit 2B1 spare pump shaft, and a new RCP cover and seal cartage.

The licensee is taking, to this writing, a conservative aggressive approach to the recovery from this RCP failure. In the areas inspected, no violations or deviations were identified.

3 Control Element Assembly (CEA) Examination

On June 7, 1990, while conducting cold functional testing of the CEAs following cycle 12 refueling outage at Maine Yankee, one CEA could not be fully inserted in to the core. Subsequent inspection of the CEA revealed that the end cap was missing from the center finger and an axial crack existed at the lower end. The upper stainless steel spacer was cocked in the bottom of the CEA finger and was causing the center finger to bind against the guide tube. The CEA could not be fully inserted into the core during cold functional testing due to interference from boron carbide pellets that had fallen into the center CEA guide tube.

The Combustion Engineering Regulatory Response Group (CERRG) has concluded that the CEA failure was most likely due to Irradiation Assisted Stress Corrosion Cracking (IASCC). CERRG further concluded that the this failure mechanism is only applicable to the older Combustion Engineering (CE) design CEA which did not have an absorber plug (other than boron carbide pellets) at the bottom of the center CEA finger. St. Lucie unit one currently has 20 CEAs of the old design, vulnerable to the IASCC failure mechanism, in the core.

The licensee's action plan to address the IASCC failure mechanism of old deign CE CEAs includes an Eddy Current Examination (ECT) of a representative number of old CEAs that have been discharged from the core. From the results of ECT examinations, the type and frequency of testing of the 20 incore CEAs will be determined.

The ECT and associated visual (VT) examinations were being performed by Asea Brown Boveri (ABB), under the umbrella of the ABB Quality Assurance program. ABB conducts business under the name Outage Services, Combustion Engineering Inc. (OSCE), Windsor Connecticut. The examinations are to be conducted in accordance with the ABB/OSCE procedures listed below.

Identification	Title
STD-NSS-079 (R7)	Procedure For The Eddy Current Wear Profiling Inspection of 14 X 14 or 16 X 16 Control Assemblies
SL-400-002 (dtd 7/13/90)	Procedure For visual Inspection of Control Element Assemblies Using Closed Circuit Video System
QAP-2.4 (R1)	Certification Program for Examination Personnel
- (R0)	Nuclear QA Plan

The inspector reviewed the above procedures in the areas of procedure approval, requirements for qualification of NDE personnel, and compilation of required records. The procedures were given a technical review in the following areas: ECT - multi-channel examination unit was specified; method of examination was described; and method and sequence of calibration was described VT - whether they contained sufficient instructions to assure that the following parameters were specified and controlled within the limits permitted by the applicable code, standard, or any additional specification requirement: method; how visual examination is to be performed, type of surface condition available; method or implement used for surface preparation, if any; whether direct or remote viewing is used; sequence of performing examination, when applicable; data to be tabulated, if any; acceptance criteria is specified and consistent with the applicable code section or controlling specification; and, report form completion.

The inspector reviewed the qualification documentation for the five OSCE examiners in the following areas: employer's name; person certified; activity qualified to perform; effective period of certification; signature of employer's designated representative; basis used for certification; and, annual visual acuity, color vision examination, and periodic recertification.

In the areas inspected, no violations or deviations were identified.

4. Material Condition

The inspector conducted a general inspection of portions of the Unit 1 and 2 Intake structures, the plant water purification system, and portions of the Unit 1 auxiliary building. The inspector noted the

following deficient or degraded material conditions , similar to or identical with deficient or degraded material conditions identified during the NRC Maintenance Team Inspection, conducted during the period of October 2, 1989 to November 3, 1989, documented in NRC Report No. 50-335, 389/89-89-24. There were no deficiency tags in evidence on any of the deficient or degraded material conditions noted. During this inspection the licensee was unable to provide the inspector, with evidence that any of the following conditions were known to them. This issue will be revisited during a future inspection.

Valve V-15378 was fitted with a drip pocket with no deficiency tag in evidence suggesting that the leaking valve was not known to the maintenance organization or entered in the maintenance management computer system.

The packing gland follower retaining nuts on two of the eight Circulating Water system pumps exhibited one thread less than full thread engagement.

Relief valve SR-12809 is missing a deflecting tail piece. There is a deflecting tail piece on same valve in Unit 1.

The gas disengasing tank support structure is heavily corroded.

The hand operating levers are missing from a number of valves in the plant water purification system some examples are SH-40168 and SH-401142.

5. Exit Interview

The inspection scope and results were summarized on July 20, 1990, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results. Although reviewed during this inspection, proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

6. Acronyms and Initialisms

ABB	- Asea Brown Boveri
CE	- Combustion Engineering
CERRG	- Combustion Engineering Regulatory Response Group
CEA	- Control Element Assembly
ECT	- Eddy Current Testing
FP&L	- Florida Power and Light
gpm	- Gallons Per Minute
HSB	- Hydrostatic Bearing
ID	- Identification
IASCC	- Irradiation Assisted Stress Corrosion Cracking
LPM	- Loose Parts Monitor
NDE	- Nondestructive Examination
No.	- Number
NRC	- Nuclear Regulatory Commission
OSCE	- Outage Services, Combustion Engineering Inc.
psig	- Pounds Per Square Inch
QA	- Quality Assurance
QC	- Quality Control
SRI	- Senior Resident Inspector
R	- Revision
RI	- Resident Inspector
RC	- Reactor Coolant
RCP	- Reactor Coolant Pump
VT	- Visual