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

Report Nos.: 50-335/92-09 and 50-389/92-09

Licensee: Florida Power and Light Company
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: May 4-8 and 18-22, 1992

Inspector: _____ 6/4/92
W. P. Kleinsorge P.E. Date Signed
Reactor Inspector

Approved by: _____ 6/4/92
J. J. Blake, Chief Date Signed
Materials and Processes Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope:

This routine, announced inspection was conducted onsite in the areas of Inservice Inspection (ISI). In addition the following areas were examined: Followup on NRC Generic Letter (GL) 89-08 "Erosion/Corrosion-Induced Pipe Wall Thinning"; NRC Information Notice (IN) "Licensee Report of Defective Refurbished Valves" and IN 91-31 "Nonconforming Magnetic Particle (14AM) Prepared Bath."

Results:

The Review of the licensee's Inservice Inspection (ISI) program indicates adequate management and control of the program currently in place, with the exception of a few minor procedural weaknesses (paragraph 2b.). The personnel implementing the program and performing the examinations were well trained and well qualified, with the possible exception of Liquid Penetrant examination personnel (paragraph 2c.). There appears to be a weakness in area of contractor understanding of,

and/or compliance with the licensee's procedures, manuals and policies (paragraph 2c.). The licensee has established an effective conservative program to maintain high energy carbon steel piping systems within acceptable wall thickness limits, however some deviations from Electric Power Research Institute (EPRI) recommendations were noted (paragraph 3a.) The licensee has taken aggressive and conservative actions in response to IN Nos. 88-48,and 91-31.

One violation was identified concerning failures to follow liquid penetrant examination procedures (paragraph 2c.)

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*G. Alexander, JPN/ESI-ISI Specialist
*G. Bossy, Plant General Manager
*C. Burton, Operations Manager
*F. Carr, JPN/ESI-Inspection Section
S. Collard, NS/JB Staff
*R. Dawson, Maintenance Manager
*J. Dyer, Quality Control (QC) Supervisor.
*J. Holt, Licensing Engineer
*D. Lowens, Quality Assurance (QA) Engineer
*L. McLaughlin, Licensing Manager
*K. Mayhew, Inservice Inspection (ISI) Coordinator
L. Motley, JPN/ESI Staff
*D. Nowakowski, JPN/ESI-Inspection
*W. West, Technical Department Manager

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

NRC Resident Inspectors

S. Elrod, Senior Resident Inspector
*M. Scott, Resident Inspector

*Attended exit interview

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

2. Inservice Inspection (ISI)

The inspector reviewed documents and records, and observed activities, as indicated below, to determine whether ISI was being conducted in accordance with applicable procedures, regulatory requirements, and licensee commitments. The applicable code for ISI, for Unit 1, is the American Society of Mechanical Engineers Boiler and Pressure Vessel (ASME

B&PV) Code, Section XI, 1983 edition with addenda through summer 1983 (83S83). Unit 1 is operating in the second 40 month period, of the second ten year ISI interval (P2,I2). Unit 1 commenced commercial operations on December 21, 1976. The applicable code for ISI for Unit 2 is ASME B & PV Code Section XI 80W80. Unit 2 commenced commercial operations on August 8, 1983. Unit 2 is in the second outage of the third 40 month period, of the first ten year ISI interval (O2,P3,I1). The licensee's nondestructive examination personnel, augmented by contract personnel from EBASCO, are performing the liquid penetrant (PT), magnetic particle (MT), visual (VT), and ultrasonic (UT) examinations. Steam Generator (S/G) tubing eddy current (EC) examination data acquisition is being accomplished by Assea Brown Boveri Combustion Engineering (ABBCE) contracted personnel with contracted ABBCE, Zetec and NDE Tech personnel and FP&L personnel performing the data analysis. Personnel were subcontracted by ABBCE for acquisition of EC date from Scientific Technology Inc. (STI) and Master-Lee (ML). All the above activities are being accomplished under the umbrella of the FP&L Quality Assurance (QA) Program.

a. ISI Program Review, Units 1 and 2 (73051)

The inspector reviewed the following documents relating to the ISI program to determine whether the plan had been approved by the licensee and to assure that procedures and plans had been established for the applicable activities.

JNS-PSL-200	(R5)	Inservice Inspection Plan First Ten Year Plan (Unit 2)
ESI-PSL-200-4	(R2)	First Interval/Third Period Inservice Examination Plan (Unit 2)
JNS-MCI QI 2.14	(R5)	Nuclear Energy Manual for ASME Section XI Inservice Inspection of Nuclear Power Plants
JPN QI 9.2	(R1)	Nondestructive Examination (NDE) Activities
ADM-CIS-9.1	(R1)	Procedure For Qualification of Nondestructive Examination Procedure Calibration Blocks/Standards
CAL-3	(R1)	Calibration Verification of Temperature Measuring Devices

b. Review of NDE Procedures, Units 1 and 2 (73052)

The inspector reviewed the procedures listed below to determine whether these procedures were consistent with regulatory requirements and licensee commitments. The procedures were also reviewed for technical content.

NDE-1.3	(R4)	Eddy Current Examination of Non Ferromagnetic Tubing with Multi-Frequency Techniques MIZ-18
NDE-2.2	(R3)	Magnetic Particle Examination
NDE-3.3	(R3)	Liquid Penetrant Examination Solvent Removable ~~Viable~~ Visible Dye Technique
NDE-3.4	(R1)	Liquid Penetrant Examination Visible & Florescent Water Washable Technique
NDE-4.1	(R4)	Visual Examination VT-1 for Welds/Bolting/Bushings/Washers
NDE-4.2	(R2 FCA)	Visual Examination VT-2 Conducted During System Pressure Test
NDE-4.3	(R3)	Visual Examination VT-3/VT-4
NDE-5.1	(R6)	Ultrasonic Examination of Pressure Vessel Welds Except Reactor Vessel
NDE-5.2	(R5)	Ultrasonic Examination of Ferritic Piping Welds
NDE-5.3	(R4)	Ultrasonic Examination of Primary Coolant Piping Welds (PSL-1 & 2)
NDE-5.4	(R9)	Ultrasonic Examination of Austenitic Piping Welds
NDE-5.7	(R3)	Ultrasonic Examination of Reactor Pressure Vessel Studs and Reactor Coolant Pump Studs

NDE-5.11	(R4)	Ultrasonic Examination of Dissimilar Metal Welds
NDE-5.12	(R3)	Ultrasonic Examination of Reactor Pressure Vessel Flange to Vessel Weld and Stud Hole Threads
NDE-5.13	(R4)	Ultrasonic Examination of Nozzle Inner Radius Areas
NDE-5.14	(R2)	Ultrasonic Examination of Reactor Vessel Welds
NDE-5.15	(R3)	Ultrasonic Examination of Reactor Coolant Pump Flywheels
NDE-5.16	(R3)	Ultrasonic Technique for Evaluation of Cracking in Steam Generator Feedwater Piping
NDE-5.18	(R3)	Ultrasonic Thickness Measurement
NDE-5.21	(R0)	Inplace Surface Examination Technique of Reactor Coolant Pump Flywheels Using Ultrasonics
Z-QA-101A	(R10)	Personnel Qualification & Certification Procedure
NDET-A-08	(R3)	Certification of NDE Tech Personnel
ABB-QAP-2.4	(R1)	Certification Program For Nondestructive Examination Personnel
STI-Q-100	(R4)	Procedure for the training, Qualification and Certification of Nondestructive Testing Personnel
ML-QAP2.2	(R3)	Qualification & Certification of NDE Personnel

Observations/Findings

- The industry has discovered that ultraviolet light darkens photosensitive eye glasses making the detection and evaluation of fluorescing indications in a dark areas progressively more difficult. As a result, the practice of prohibiting the use of photosensitive eye glasses during the performance of fluorescent NDE examinations by NDE examiners has become the norm for the industry. This prohibition was codified by the ASME B&PV Code Section V 83W83 [T-646.2 (b) and T-726 (c)]. Procedures NDE-2.2 and NDE-3.5 include florescent examination techniques performed under ultraviolet lighting conditions but do not include the photosensitive eye glasses prohibition for examiners performing those florescent NDE examinations. Although 83W83 post dates the licensee's committed Code edition/ addenda of 83S83, that does not diminish the advisability of the practice.

- Procedure NDE-3.4 does not address the ASME B&PV Code Section V, Paragraph T-643 prohibition of performing a florescent penetrant examination following a color contrast penetrant examination.

- Procedure NDE-2.2, paragraph 5.8 C specifies magnetizing current in **AMP/inch** vice **AMP/inch of diameter** as specified in ASME B&PV Code Section V.

- Procedure NDE-4.2 does not require the documentation of the fluid for systems that are pneumatically tested in lieu of hydrostatic testing. This information is important because this substitution is only permitted for gaseous systems.

- Procedure NDE-4.2 does not require the documentation of the serial numbers of the pressure or temperature measuring instruments used for test.

- Visual examination procedures NDE-4.1 and NDE-4.3 inconsistently specify, or do not specify, some inspection attributes which include: missing parts (valve inspections), the presence of boric acid, physical weld condition.

- If the licensee intends to use video tape as a portion of the record for remote visual examinations, it is recommended that the visual examination procedures specify that the tape include

a sound track narration that describes the examination, the area examined, the specific findings, and the report identification.

The licensee indicated that they would consider the above observations and make necessary changes to the procedures.

All procedures reviewed appeared to contain the necessary elements for conducting the specific examination. (Except as noted above)

c. Observation of Work and Work Activities, Unit 2 (73753)

The inspector observed work activities, reviewed certification records of NDE equipment and materials, and reviewed NDE personnel qualifications for personnel who had been utilized in the ISI examinations during this outage. The observations and reviews conducted by the inspector are documented below.

Activities Observed

The inspector observed UT examination activities associated with the 2A Steam Generator (S/G) torus to dome weld, the 2A Shutdown Heat Exchanger, Reactor Pressure Vessel (RPV) nuts, and a Safety Injection (SI) system piping weld.

The inspector observed MT examinations of RPV studs.

The inspector observed PT examinations of piping welds in the Reactor Coolant (RC) and SI systems. The inspector performed an independent evaluation of the indications obtained to confirm the NDE examiner's evaluation.

The inspector observed EC data acquisition and data evaluation activities associated with the S/G.

The inspector observed the video tape of the remote visual examination of reactor vessel alignment keys, integral mating surface of loop nozzles, and reactor vessel mating surface.

Observations/Findings

The inspector noted the following during the observation of ISI work activities:

- Procedure NDE-3.3, Revision 3, Liquid Penetrant Examination Solvent Removable Visible Dye Technique, Paragraph 5.1 A. states "The examination area for circumferential and longitudinal welds shall be the weld and base material for a distance of 1 inch on each side of the weld fusion line.". Contrary to the above, on May 19, 1992, the inspector noted that penetrant dye was applied to an area only 3/4 inch wide on each side of ASME Code Class 2 circumferential butt weld SI-424-2-SW-3 for several inches. The inspector pointed this fact out to the contracted PT examiner who applied dye to the deficient areas, waited the appropriate dwell time and subsequently completed an acceptable PT examination. It should be noted that although the above is a violation of the licensee's procedure, the examination is acceptable to ASME B&PV Code Section XI which requires examination of the weld and 1/2 inch of adjacent base material. The licensee has documented this procedural violation in Non Conformance Report No. 92-001.

- Procedure NDE-3.3, Revision 3, Liquid Penetrant Examination Solvent Removable Visible Dye Technique, Paragraph 3.4 A.2. states "Prior to examination, the surface to be examined and any adjacent area within at least 1 inch shall be dry and free of any dirt, grease, lint, scale, welding flux, paint, weld spatter, oil, or other extraneous matter that would interfere with the examination.". Contrary to the above on May 7, 1991, the inspector noted, at that point in the PT examination of ASME Code Class 1 circumferential socket weld No. RC-142-FW 7, after the completion of the precleaning/surface preparation and prior to the application of penetrant dye, that there was a buildup of white foreign matter at the toe of the weld on the pipe, that would interfere with the examination. The inspector brought this fact to the attention of the contracted PT examiner who recleaned the weld and adjacent base material and subsequently completed an acceptable examination. It should be noted that had the examination been permitted to continue uninterrupted, the buildup of white foreign matter would have most likely caused an indication to appear at the toe of the weld, resulting in the subsequent recleaning and retesting of that weld. The licensee has documented this procedural violation in Non Conformance Report No. 92-001.

The inspector and the resident inspector staff were given to understand that certified contracted ISI NDE examiners, prior to the

performance of any examinations, were required to demonstrate proficiency in each NDE examination method that they would employ on site. A senior member of the licensee's JPN/ESI Inspection Section staff, stated that performance demonstration was only required for UT and EC (the volumetric methods), the **"important"** methods. Performance demonstration is not done for PT, MT, and VT (the surface methods). The licensee indicated that they performed surveillances of ISI NDE examinations in progress, however only one PT examination was observed during this outage.

With the aging of power plants, surface examination becomes increasingly important. The inspector is concerned that complacency with regard to surface examination by the licensee's staff, and inattention to detail on the part of examiners, could result in the effects of plant aging going undetected.

As indicated above, NDE examiners failed to perform ISI PT examinations of ASME Code Class 1 and 2 pipe welds in accordance with procedural requirements. Failure to accomplish activities affecting quality in accordance with applicable procedures is a Violation of Title Ten Code of Federal Regulations (CFR), Appendix B, Criterion V. This violation will be identified as **50-335,389/92-09-01: Failure to Follow Liquid Penetrant Examination Procedure.**

- In preparation to witness the PT examination of the class 1 RC system pipe welds the inspector and the PT examiner were briefed by a contracted member of the Health Physics (HP) staff. This HP staff individual left the inspector and the PT examiner with the impression that they should walk on the small diameter (2-inch) piping to avoid stepping on the contaminated floor. Climbing on piping is a poor practice because of the potential for damage to the piping, and the pipe supports and potential for injuries to personnel. The inspector noted many examples where pipe insolation was damaged by foot traffic throughout the plant. The licensee has no formal documented prohibitions for climbing on installed equipment and piping. However the practice of walking or climbing on insulated piping is discouraged in the 1992 Unit 2 Outage Manual, page 8, because the manual indicated, crushed insolation has reduced thermal efficiency.

- The same contracted HP staff individual, discussed above, descended and ascended a ladder totally ignoring a conspicuously posted red tag that stated **"WARNING THIS**

SCAFFOLD IS NOT COMPLETE DO NOT USE." The above is contrary to Administrative Procedure No. 0010724, Revision 3, "Use of Scaffolds, Ladders Boatswain Chairs and Manbaskets," paragraph 8.2.6.

- One of the contracted examiners performing the UT examination on the 2 A shutdown heat exchanger, was attired in only an open lab coat, gloves, walking shorts, shoes and shoe covers. This individual's legs from the ankle to above the knee were not covered. During part of the examination the individual was sitting on the floor with his legs extended under the heat exchanger while he manipulated the UT transducer on the surface of the heat exchanger. Working in short pants is contrary to the licensee's safety policy.

The above five examples of failure to comply with the licensee's procedures, manuals and policies were committed by contracted personnel. There appears to be a weakness in this area. Increased emphasis to procedure compliance should be given during orientation sessions for contracted personnel.

d. Data Review and Evaluation, Units 1 and 2 (73755)

Records of completed ISI nondestructive examinations indicated below were reviewed.

The inspector reviewed the completed ISI report for the second outage, first period, second interval (O2,P2,I1), for Unit 1, completed examination reports first outage third period, first interval (O2,P3,I1).

Observations/Findings

- As the result of EC examination of the steam generator tubes during the most recent outages, a total of 472 tubes were plugged on both units, as indicated below:

	S/G 1A	S/G 1B	S/G 2A	S/G 2B
Previously Plugged Tubes	729	523	242	180

	S/G 1A	S/G 1B	S/G 2A	S/G 2B
Tubes Plugged O2,P2,I1 (U1) RF11	284	152		
Tubes Plugged O2,P3,I1 (U2) RF7			22	14
Total Tubes Plugged	1013	675	264	194

- All of the examination reports reviewed appeared to contain the required examination information including disposition of indications, if any.

- A random sample of current examination results were compared with historical examination results. No major discrepancies were noted during the comparison.

In the areas inspected, no violations or deviations were identified except as noted in paragraph 2c.

3. Followup (92701)

a. NRC Generic Letter GL 89-08: "Erosion/Corrosion-Induced Pipe Wall Thinning"

This GL requested licensees to provide assurances that they have implemented a long term Erosion/Corrosion (E/C) monitoring program, consisting of systematic measures to ensure that E/C does not lead to degradation of single and two phase high energy carbon steel piping systems.

As discussed in NRC Inspection report 50-335,389/91-24 the licensee has established an E/C inspection program which uses the Electric Power Research Institute (EPRI) CHEC and CHECMATE computer programs, industry data and previous inspection data as predictive tools for the determining and prioritizing inspection locations. This program is implemented by Nuclear Engineering Department Standard, MN-3.9 revision 1, "Evaluation of Erosion/Corrosion in Power Plant Piping".

The inspector reviewed the licensee's program, observed grid marking, observed data collection, interviewed licensee personnel and reviewed inspection data and calculations to evaluate the licensee's E/C program.

Observations/Findings

The inspection sample is selected on an outage by outage basis, based on the data from previous outages. The licensee's program currently deviates in the following ways from the EPRI CHECMATE recommendations:

- EPRI recommends that thickness data be collected at the intersections of a standard grid pattern. The inspection grid should be setup to allow reinspection of identical points during subsequent inspections. The licensee's method of marking grid lines does not assure a parallel pattern. The inspector noted several examples where the deviation from parallelism amounted to more than 1/2 of the grid spacing. Subsequent reinspection are not likely to be at identical points.

- EPRI recommends that the inspection cover an area from two inspection grids up stream of a component to two diameters down stream of the component. This provides an understanding of the counter bore area and a clearer understanding of the E/C pattern in the component. Currently the licensee does not examine two grid up stream of the component.

- EPRI recommends the use of TDAT data to modify line factors in order to make the electronic model better represent the actual field condition. Currently the licensee does not use TDAT data.

Not withstanding the above, it appears that the licensee has established an effective conservative program to maintain high energy carbon steel piping systems within acceptable wall thickness limits.

b. NRC Information Notice (IN) 88-48: "Licensee Report of Defective Refurbished Valves"

In this IN and the two associated supplements, the staff discussed the problem that Pacific Gas and Electric Company found with what they

believed to be a valve manufactured by Henry Vogt Company in a non-safety related (NSR) system.

The licensee made a thorough review of all Quality Level 1, 2 and 3 Purchase Orders for valves purchased for the St Lucie site from the start of construction to the present, in order to determine whether any of the IN listed suppliers down to the fourth tier, had supplied valves to the plant. No valves supplied by those suppliers were identified. It should be noted that the absence of records precluded a search for suppliers of NSR valves. This fact is mitigated because the licensee's program does not permit NSR materials or equipment to be used in safety related applications under any circumstances.

The licensee has taken aggressive and conservative actions in response to this IN.

c. NRC Information Notice (IN) 91-31: "Nonconforming Magnetic Particle (14AM) Prepared Bath"

This IN transmitted a Magnaflux Notice which recalled three batches of 14AM MT aerosol prepared bath, and included a warning for six others.

The licensee reviewed all batch certification documents for Magnaflux 14AM MT aerosol prepared bath, used at FP&L nuclear facilities, looking for the suspect batches. None were identified.

The licensee has taken aggressive and conservative actions in response to this IN.

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

4. Exit Interview

The inspection scope and results were summarized on May 22, 1992, with those persons indicated in paragraph 1. The inspector described the areas inspected and the findings listed below. Although reviewed during this inspection, proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

(Open) Violation **50-335,389/92-09-01: Failure to Follow Liquid Penetrant Examination Procedure.**

5. Acronyms and Initialisms

ABBCE	-	Assea Brown Boveri Combustion Engineering
ASME	-	American Society of Mechanical Engineers
B&PV	-	Boiler and Pressure Vessel
CFR	-	Code of Federal Regulations
DPR	-	Demonstration Power Reactor
EC	-	Eddy Current
E/C	-	Erosion/Corrosion
EPRI	-	Electric Power Research Institute
FP&L	-	Florida Power & Light
GL	-	NRC Generic Letter
ID	-	Identification
ISI	-	Inservice Inspection
IN	-	NRC Information Notice
HP	-	Health Physics
ML	-	Master-Lee
MT	-	Magnetic Particle
NDE	-	Nondestructive Examination
No.	-	Number
NPF	-	Nuclear Power Facility
NRC	-	Nuclear Regulatory Commission
NSR	-	Non Safety-Related
P.E.	-	Professional Engineer
PT	-	Liquid Penetrant
QA	-	Quality Assurance
R	-	Revision
RC	-	Reactor Coolant
RF	-	Refueling
RPV	-	Reactor Pressure Vessel
SDC	-	Shut Down Cooling
S/G	-	Steam Generator
SI	-	Safety Injection
STI	-	Scientific Technology
UT	-	Ultrasonic
VT	-	Visual